MARINE REVIEW

VOL. XXX. CLEVELAND, O., OCTOBER, 6, 1904. No. 14.

Panama Canal: Its Present Status

Twenty-three years ago when Ferdinand De Lesseps broke ground for the Panama canal the London Times observed that whoever turned the first shovelful of earth the United States would turn the last. That was certainly a pathetic statement. The progress of events have proved it to be true. The Panama canal, begun by France, is to be completed by the United States. There is a sense of national satisfaction in the prosecution of this great engineering feat in which another nation older than our own, failed miserably. The American government paid to the republic of Panama the sum of $10,000,000 stipulated in the treaty for this strip of territory through which to build the canal. In addition the sum of $40,000,000 was paid to the new Panama Canal Co. for its property in the Isthmus. It is estimated that it will require about $150,000,000 to complete the work so that, exclusive of interest charges, the canal will cost the United States $200,000,000.

GENERAL VIEW OF CULEBRA CUT, SHOWING DREDGER AT WORK.

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The Isthmian Canal Commission, sketches of the members of which will be found in another column, have lately returned from the Isthmus, where pretty much the entire summer was spent in a personal investigation of existing conditions. The commission lost no time whatever in getting down to actual business. After five months of conscientious study in the Isthmus, reviewing the work already done and examining the plans of the French company, the commission has concluded that it is absolutely impossible to discuss at this time the engineering and constructive features

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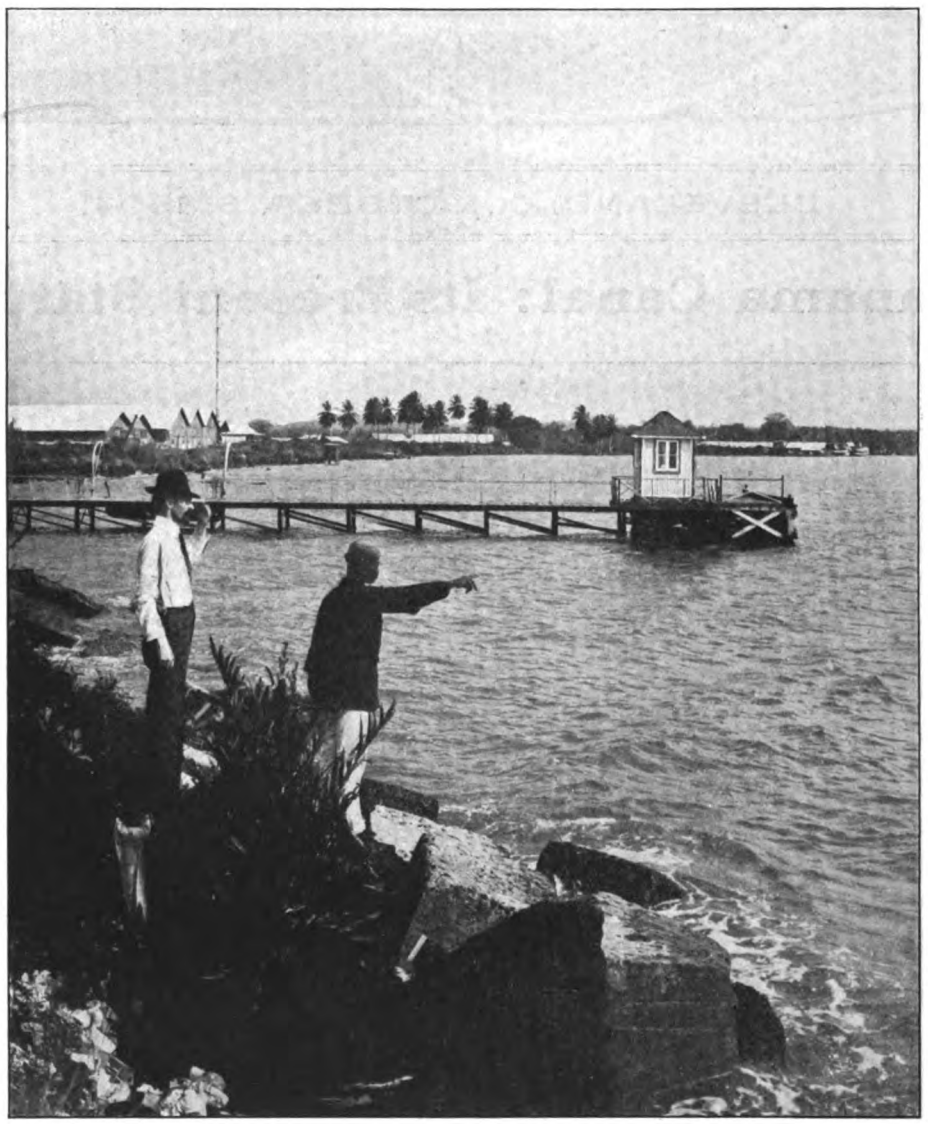
of the canal. The salient construction features have not yet been determined and cannot be until the summit level of the canal is definitely fixed. That a great deal of preliminary work is yet to be done before it will even be determined whether the summit level of the canal will be at 80 or 90 ft. above the sea, which is the highest level suggested, or whether it would be even at sea level, may be seen by reading the statement from Mr. Carl Ewald Grunsky in another part of this issue. Rear Admiral John G. Walker, the chairman of this commission, entirely agrees with the views set forth in Mr. Grunsky's letter.

The original De Lesseps idea contemplated a sea level canal, but of much smaller sectional area than is now necessary. In point of fact if De Lesseps had been able to complete his original undertaking his canal would now be inadequate to meet present conditions. Ships have grown enormously during the past few years and as the harbors of the various ports of the world are deepened they are likely to continue to grow. It will be understood, however, that in this discussion of a sea level canal there can be no such thing as a purely sea level canal on the Isthmus of Panama. The tide in Panama bay has a rise and fall of about 18 ft. and the tide in Colon harbor has a rise and fall of about 18 in. This is a natural condition which would require lockage approximating 20 ft. if the canal is to be continuously available to commerce regardless of tides.



MOUTH OF PANAMA CANAL, ATLANTIC END.

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At present the only actual work under way, as far as physical changes are concerned, is upon the great Culebra cut which was the main work of the French company. With improved methods of blasting, excavating, loading and handling material Chief Engineer John F. Wallace has materially increased the output and decreased the cost of excavation. The French company appears to have made no proper estimates of the amount of earth removed from the cut. It seems that they were simply guessing and their guesses were too high by about 30 per cent. Some of the French maps also, upon which very great labor was expended and upon which an estimate of $1,000,000 in value was placed by the commission, have proved entirely unreliable and little reliance can be placed upon their typography except in the immediate axis of the canal. The present work has been largely done by machinery already existing upon the Isthmus, but one 70-ton and two 90-ton steam shovels have been purchased and are now en route to the Isthmus. The commission is now also advertising for eleven more steam shovels, all of the latest and most improved type, intending to use them in this the great cut of the canal. The commission is also advertising for 1,000 large dump cars and 500 flat cars for use in connection with the excavation at Culebra. Outside of the work done on the Culebra most of the digging accomplished by the French company avails nothing. Rank vegetation and earth fillings have made it necessary to begin all over again in most of the seventeen districts into which work was divided by the French company. About 500 men are now employed in excavating material in the Culebra cut.

Under the treaty with Panama the government is required to supply the city of Panama with water, and the commission has therefore begun work on the construction of a reservoir in the valley of the upper Rio Grande. Bids for cast iron pipe for conveying the water to the city have just been opened. Work is also about to begin on a distributing reservoir for the Panama water works and bids will soon be called for sewer pipes for use in that city, the survey for which has been completed. Altogether at the present time for all purposes the commission is employing something more than 2,000 men, a large part of this force being engaged upon sanitary work, cleaning, draining, and waging war upon the mosquitoes.

As for the machinery left by the French company, it is estimated that $29,000,000 was paid for it. About $4,000,000

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worth of it is now in good order, the rest having been exposed to one of the most destructive climates in the world and has been practically destroyed. The condition of this machinery proves very conclusively what this climate will do to unprotected metal. A couple of photographs recently received from the Isthmus of some steel ties on a piece of track in the Culebra cut shows them in a badly warped condition whereas wooden ties laid at the same time are in a good state of preservation.

The commission has very wisely made the question of sanitation its first concern, as is evidenced by the energy with which it is undertaking the work of providing Panama and Colon with a pure water supply and the war of extermination which it has waged on disease carrying insects. It has been scientifically proved that the mosquito is the most prolific medium of fever infection. The sanitary department is under the direction of Col. Gorgas, who is assisted by Col. Legarde, Major Ross and Major Carter, the last named being the chief of quarantine officers. These men have done much to make the canal zone habitable, as will be seen from Mr. Grunsky's letter. Panama is not necessarily an unhealthful place; temperatures are not exceedingly high; it is absolutely free from sunstroke and it is as habitable as other places in the tropics.

Chief Engineer Wallace says that there are now at work six divisions of the engineering corps, each in charge of a resident engineer, who reports to him as chief engineer. Soon after Mr. Wallace's appointment as chief engineer he gave the office of mechanical engineer to Mr. C. A. Strom, who has already done a great amount of work in improving the equipment left by the old company. Repair shops have been established, the largest at Bass Batachin, where the machinery is overhauled. The jungle has been cut away over a large area and immense quantities of machinery exposed, still in fair condition but neglected or forgotten for the past ten years. Such machinery as could be housed conveniently was well cared for by the French administration on the suspension of their operations, and this, locomotives, tools, etc., is rapidly assuming effective form.

The French appear to have paid much attention to bodily comfort and small pumping stations with storage tanks accompanied by shower baths and plunges are frequent. However, those constructed of iron have suffered the corrosion of the climate and are in a sad state; the few constructed of concrete are in a good state of preservation. As for the dwellings, store houses and shops, many are so

Mr. Carl Ewald Grunsky's Statement

Your letter of Sept. 17 has received consideration. It does not seem to me that the time has yet come for the commissioners to give expression to their views relating to the problems involved in the construction of the Panama canal. The combined judgment of all of the members of the commission, on the basis of the fullest data obtainable must enter into the determination of the main features of the work, and no final conclusions can be reached by them in advance of the completion of the preliminary studies now being made.

The cost of excavation, with the best type of American machinery and the rate at which the commission may hope to take out and dispose of the excavated material, will be important factors in determining whether the summit level of the canal is to be at 80 to 90 ft. above the sea, which is the highest level suggested, or whether it will be better, everything considered, to make the summit level lower, possibly even at sea level.

Before this question is finally answered by the commission studies now being made must be completed at Gamboa, relating to the feasibility of constructing a high dam at that point, which would be an aid in controlling and disposing of the flood flow of the Chagres river; also at the possible sites at Bohio and at Gatun; along portions of the present canal line, and along alternate locations, as at Tiger Hill, which have more or less merit. It is necessary, too, that at Colon and in Limon Bay thorough investigations be made to serve in planning a harbor for the Atlantic end of the canal and a canal entrance adapted to local conditions, and adequate to meet all requirements.

Until these matters have been fully considered and acted upon by the commission, the individual commissioners will naturally hesitate to give expression to opinions, and I am, therefore, declining to contribute to discussions of the engineering and constructive features of the work.

The experience of the commission on the Isthmus has thus far been very satisfactory. The work will be carried on in a business like way, with the same certainty of accomplishing results which would be anticipated if the canal were located somewhere in the United States. It is hoped that your readers will not be misled by any exaggerated accounts of the unhealthfulness of the Isthmus; its reputation in this respect is bad; in large measure, undeservedly so. The climate is similar to that of the tropics elsewhere. It is not conducive to the same energetic physical work expected of laborers in temperate climates, but then, to offset this, we are told that the Isthmus is free from sunstrokes. Temperatures are not excessively high, and those who become accustomed to working in the open are not exposed to unusual danger.

There is no yellow fever on the Isthmus at present; and the arrangements that have been made for the prevention of this or any other infectious or contagious disease, which may be brought to the Isthmus from other points, have been so well considered and the organization of our health department is so complete, that we confidently expect to keep the Isthmus as healthy as any similarly located region of the tropics.

Yours very sincerely,

C. E. GRUNSKY.

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dilapidated that their replacement is cheaper than their repair. The making of roads in the neighborhood of buildings has also been discovered to be imperative as one of the greatest annoyances in the zone is an almost microscopic parasite which infests the grass and attacks every living creature, inflicting itching wounds about the size of the blunt end of a lead pencil. He is a habitant of the grass exclusively, however, and can be avoided by building wide paths to walk on.

It is a mistake to suppose, however, that the engineering corps in the field have unusual hardships to contend with. Of course, they are subjected to inconveniences inseparable from open air work remote from any base of supplies, but even this form of existence has its advantages since they have the joint blessings of good appetite and sound sleep. As each member of the party carries his equipment on his own back it is necessarily limited to necessities and consists of a hammock, a rubber poncho, a square of mosquito netting and a toothbrush. No extra clothing is carried. Fish and game are quite abundant so that only the staples such as coffee and beans are carried. Each engineering party consists of one typographer, one transit man, one leveler and four rodmen. The major part of the field work up to the present time has been along the line from Colon to the Emperador cut.

COLON FROM THE LIGHTHOUSE.

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It is practically settled that work for a year hence will be merely preparatory. The commission has yet to learn the nature of the actual work of excavating before it can be prepared to advertise for bids. By that time it will have discovered the actual cost of excavation. If contractors are willing to do the work cheaper than this they will get it to do; if not the commission will do it itself.

The commission at first had some difficulty with the republic of Panama because the republic objected to the free entry of American goods into the zone. Neither Panama city nor Colon are in the zone but the republic wanted to levy its accustomed duty upon all goods entering the territory and in order to do so wanted all goods to pass through the ports of Panama and Colon. The zone, however, has two ports of its own, Ancon on the west and Cristobal on the east, and it is not therefore necessary that goods should be cleared through either Panama or Colon. This point has now been definitely settled, however, and all goods originating from United States ports, whether of foreign or American manufacture, are admitted free. Of course, this virtually means that American products have the preference in the zone because no foreign goods can come into the United States without first paying the duty levied by congress. Their transfer to the zone, however, does not entail an additional duty upon them.

EFFECT ON THE SOUTH.

The fact that the Panama canal will, when completed, open up a wide field to the industries of the Mississippi valley is one which the south is already discussing. In fact, there is already talk of the operation of a line of steamers between New Orleans, the Pacific coast and eastern Asia under the title of the United States & Orient Steamship Co. The Mississippi and its branches represent no less than 16,000 miles of navigable waters. Of course these waters are all of shallow draught and can accommodate vessels of only limited carrying capacity, but it makes an internal system nevertheless of gigantic proportions and capable of indefinite development.

The Mississippi valley embraces a section comprising twenty-two states and territories. New Orleans is the natural base for all this river navigation. The possibilities of industrial development in this territory are limitless. It has a natural capacity for sustaining millions.

Curiously enough the development of internal waterways with reference to the improvement of southern ports will have a tendency to diminish the commerce of the great lakes. This diminution will not be serious

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but it will be certain. It cannot sensibly affect the vital commerce of the lakes, which is the transportation of iron ore, but it can divert its grain trade. Grain after it reaches Buffalo must seek the seaboard by the railway, entailing the cost of elevator charges, rehandling and the expensive haulage in railway cars. It is conceivable that a fair proportion of this traffic out of Chicago and St. Paul would seek the all-water route to New Orleans should the route be rendered at all adequate.

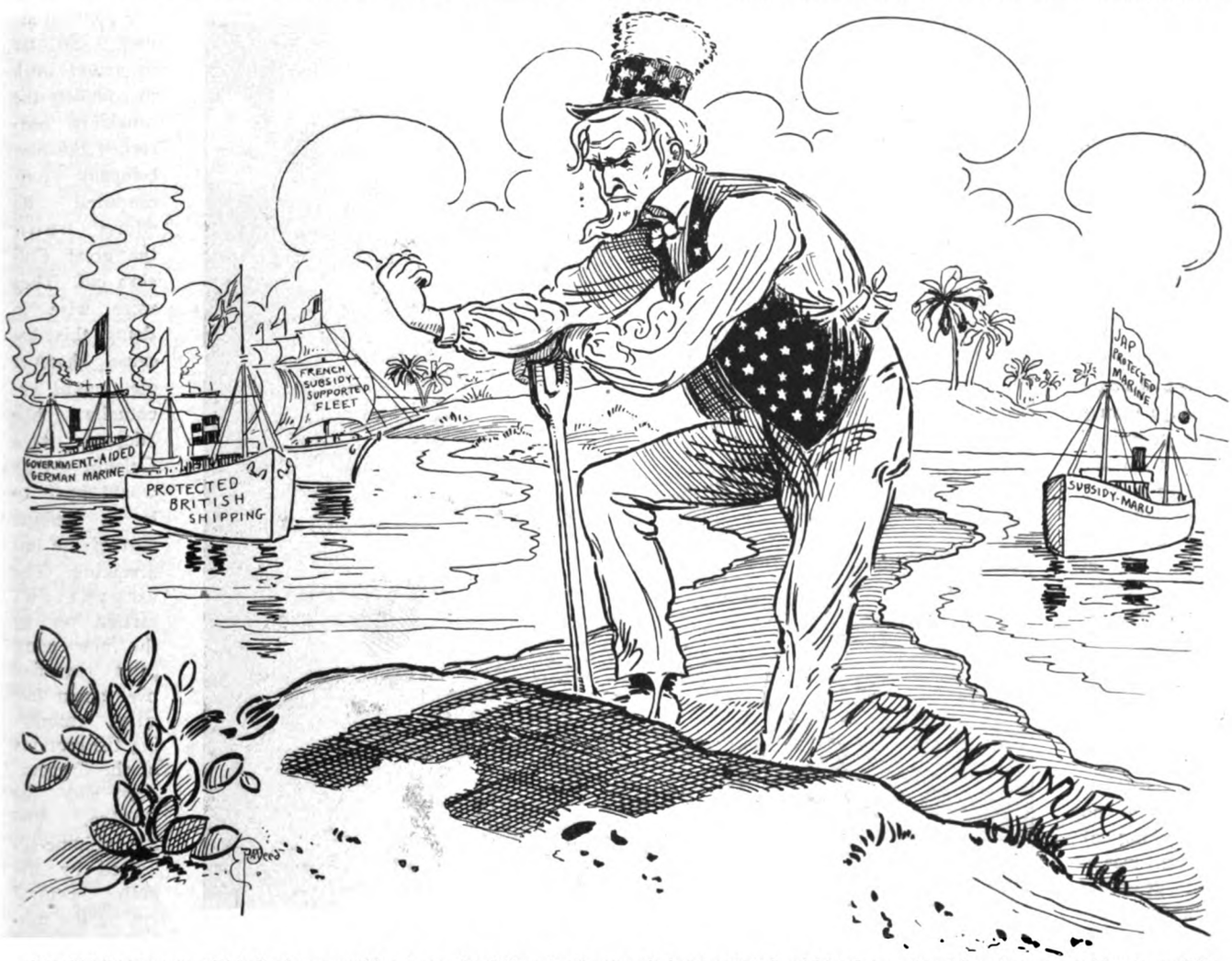
SANITARY CONDITIONS IN PANAMA

Col. Gorgas, surgeon general of the Atlantic division of the United States army, who has been acting as sanitary officer of the Panama canal zone, returned to this country recently and outlined the work that the sanitary department has done to make the zone habitable. Discussing it he said:

"We have established quarantine stations at both ends, at Panama and at Colon, and every vessel arriving at either port is now regularly examined just as at this port. This was our first step, in order to prevent the bringing of disease. We found that many people were arriving from ports in Chile and from cities in Peru, where bubonic plague existed. One or two cases developed in Colon, and we were scared for a time, but it did not spread. Now we quarantine every arrival from those cities until they have been eight days out.

"Yellow fever and its carriers are now receiving attention, and we have the disease so well in hand that within two years it will be practically unknown. We have ordered all people to kill the mosquitos found in the houses, and a band of mosquito killers that we have organized looks after the work on the outside. All through the zone swamps are to be found in which are the mosquitos that cause the fever. We have learned by scientific investigation that it is the larvae that are infected, and the only way to prevent yellow fever is to fill in the ponds and swamps. The mosquitos there are bad, but they do not compare in numbers with those in New Jersey.

"We have also learned by investigation that a yellow fever bearing mosquito never moves more than 100 yards. Knowing this we think that it would be foolish to try to fill in all of the swamps at this time. When the canal is finally completed, I think we will have one of the most healthy places in the world. The canal commission is the king, legislature, courts, and everything else down there now. They are following out the laws formerly used there, making only a few changes to agree with American ideas. The Panamanians are doing well, conducting their government on a quiet, business-like basis. They start out with no debts and a surplus. Their army is now down to 200, and to still reduce expenses they have offered for sale the two tugboats they have, armed as gunboats."



The Old Gentleman: "This digging a canal for these other fellows is all very well, but I can't help wishing I saw a few ships of my own waiting to use it."

It is understood of course that all goods emanating from the United States, whether of foreign or American manufacture, are to be admitted to the canal zone free. A constant stream of supplies will have to go forward for a period of ten years.

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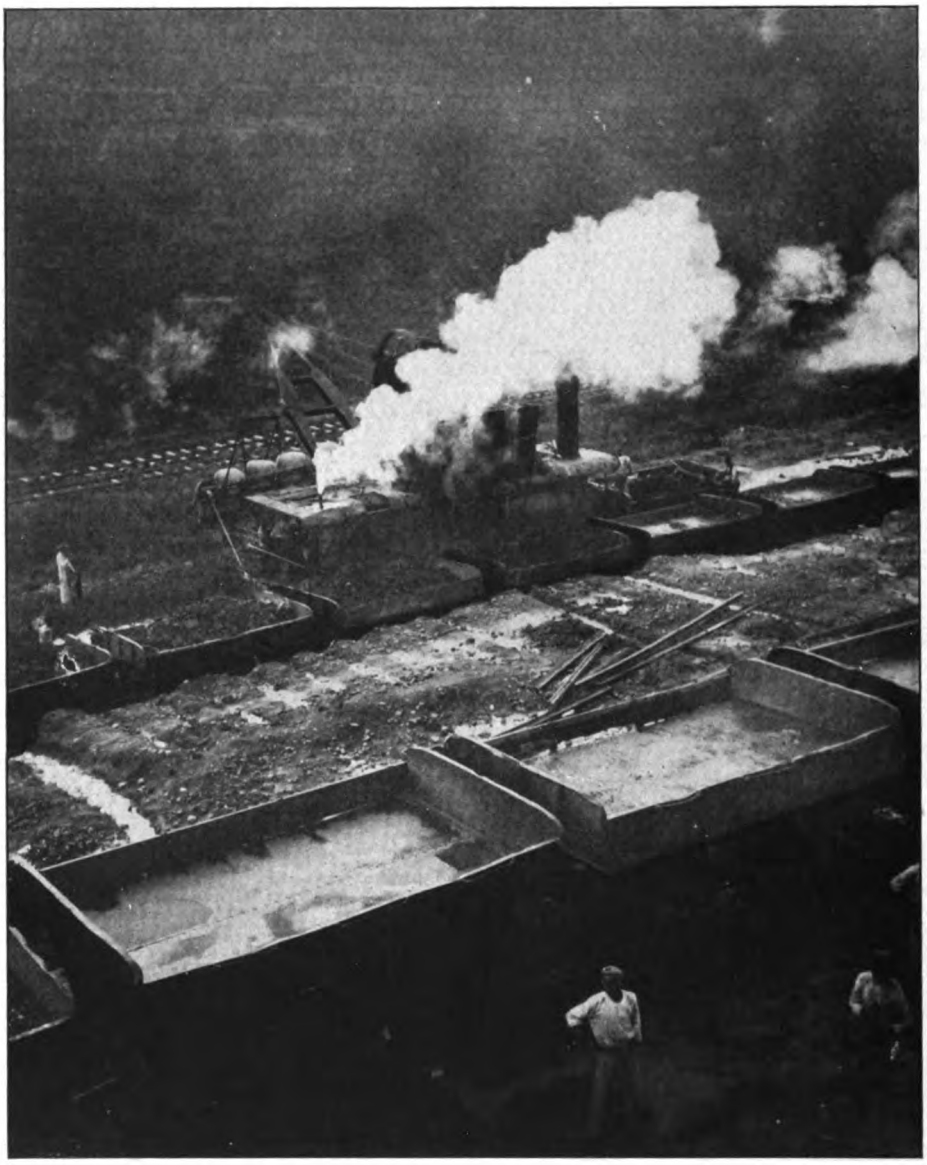
Plans for Panama

Since the summit level of the Panama canal has not yet been determined, it is impossible to intelligently discuss the physical features of the canal except in a general way. Until the surveys are completed by Chief Engineer John F. Wallace, which will not be until a year hence, the exact character of this connection between the Atlantic and Pacific oceans cannot be known. Briefly, however, the canal will be 46 miles long, varying from 250 to 500 ft. wide at the top and 150 ft. wide at the bottom. The present plans call for a depth of 35 ft., but owing to the great increase in the draught of ships it may be determined later to make the depth 40 ft. The only actual construction work at present under way is on the Culebra cut where the French canal company had already done a great amount of excavation.



FILLING FLAT CARS WITH EARTH, CULEBRA CUT.

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Probably no undertaking of modern times is more generally misunderstood and misrepresented than the construction of the Panama canal. The construction of this canal was originally undertaken by the French nation. In 1879 an international congress met at Paris and after investigating various routes recommended the building of a sea level canal from Colon on the Atlantic to Panama on the Pacific. It was Ferdinand De Lesseps, emboldened by his success in the construction of the Suez canal, who persuaded the nation to undertake this great work. Like Suez he wanted to make Panama a sea level canal. It is a matter of history how the physical difficulties, handicapped by gross corruption on the part of the promoters, served to bankrupt the company and to defeat De Lesseps. The company at the end of 1888 was forced to abandon its undertaking owing to the fact that it could no longer obtain the necessary resources from the public. By this time $156,000,000 had been expended upon the Isthmus, of which sum about $88,000,000 had been put into excavation and embankment.

In October, 1894, a new company was formed for the purpose of completing the canal. It was organized with a capital of $13,000,000, which sum was actually paid in. The new company resumed work on the canal and carried it on regularly until the Spanish - American war broke out, which of course changed its entire political aspect. So far as actual work to complete the canal is concerned the new company concentrated its efforts upon the great Culebra cut. They were wise in doing this because whatever plan might eventually be adopted the Culebra cut would have to be a definite part of the undertaking. The excavations carried on by the new company extended over about five miles, embracing the sections of the Emperador and the Culebra. The total volume removed by the entire central cut by the new company was about 5,000,000 cubic yards. This was accomplished chiefly by the plant received from the old company with some new machines that it was desirable to test with a view to future work.

Meanwhile the most exhaustive surveys were being made, and after elaborate measurements to determine topographical features and geological construction the new company definitely decided to abandon the idea of a sea-level canal. The plan of the new company may therefore be summed up as follows: The total length of the canal from the point where it leaves the bay of Limon to the point where it enters the bay of Panama is 43.5 miles. About 3.1 miles should be added for its extension through the bay of Panama to reach deep water, which makes its total length 46.6 miles. The summit level has its bottom level at a height above mean tide of 68 ft. and its highest water level at 102.5 ft. above mean tide. The descent of the ocean on each slope is ef-

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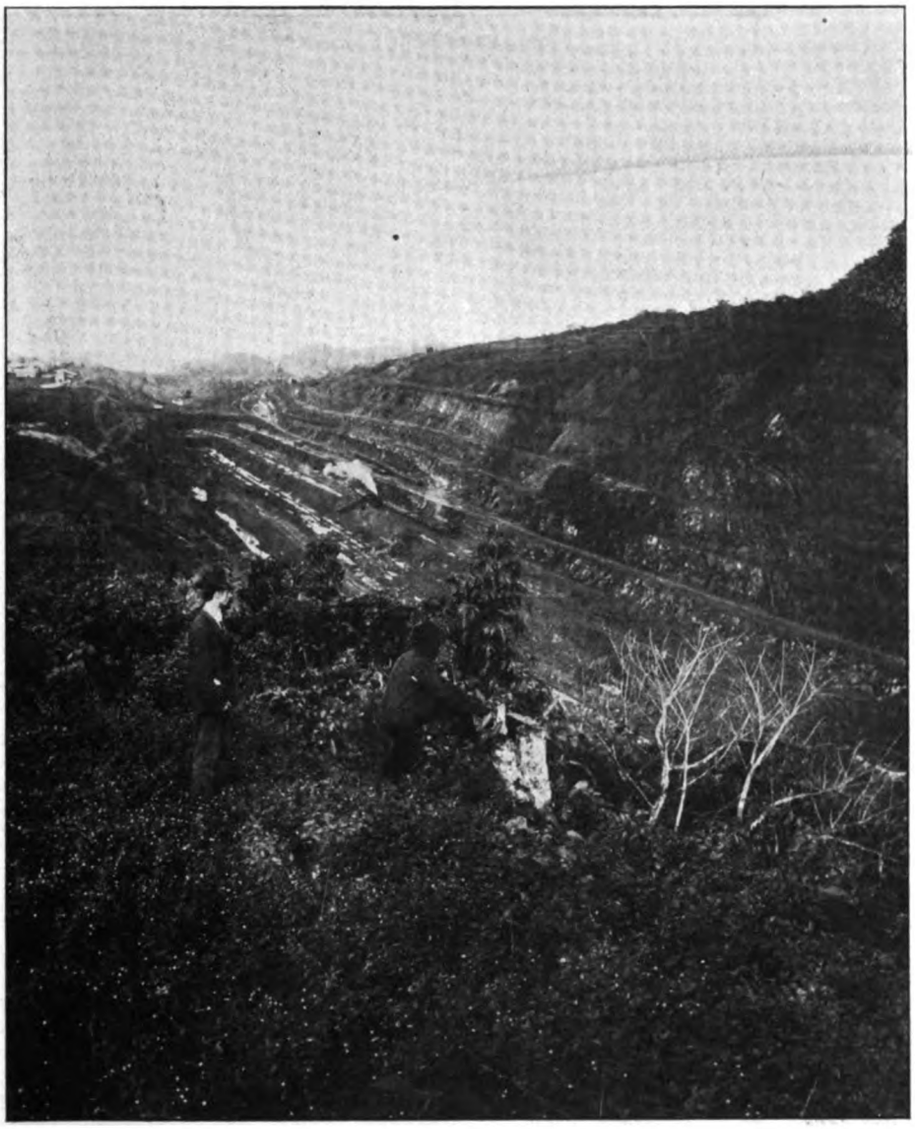
fected by four locks, disposed on the Atlantic side in two flights of two locks and on the Pacific side in one flight of two locks and two single locks. The locks are all double with two parallel chambers each 82 ft. wide and having a serviceable length of 738 ft. Their greatest lift is 29.5 ft. The Atlantic level whose tides from the bay of Limon are insignificant extend to Boko where is encountered a flight of two locks. The second level consists of a great lake into which the Chagres river discharges and from which the canal forms a submerged channel extending to Obispo ending in a flight of two locks. The normal level of the lake is 55.8 ft. above mean tide; but it may fall to 52.5 ft. in seasons of extreme low water, or rise, rarely, at the moment of an exceptional flood of the Chagres river, to 65.6 ft. The next level, that of the summit already described, extends to the single lock of Paraiso. Its water may vary between 97.5 and 102.5 ft. above tide. The fourth level terminates at the flight of two locks at Pedro-Miguel, having a water height which may vary between 73 and 76 ft. above tide. The fifth level ends at the single lock at Miraflores. Its water plane may oscillate between 17 and 20 ft. above tide. Beyond the lock the Pacific level is reached. Here allowance is made for a tidal range of 9.8 above and 3 below the main level. The summit level will be supplied with water by a feeder conveying water drawn from the Chagres at Alhajuela, about 9.5 miles from the canal. The needful reserve will be restored by a masonry dam established on rock in a gorge of the valley. This dam will form a great reservoir, intended in part to store the reserves needed in the season of low water and in part to co-operate with the lake of Bohio in holding back a portion of the volume in great floods and thus controlling them.

The normal width at the bottom of the canal will vary in the different levels. For that of the Atlantic it is 98.5 ft. with two great passing stations where it is 197 ft. In the channel through Lake Bohio it is 164 ft.; in the summit level, 118 ft.; in the next two levels and in the land part of the Pacific level, 98.5 ft.; and in the channel through the bay of Panama, 164 ft. The minimum draught of water throughout the canal is 29.5 ft. increased to 32.8 ft. at the middle line of the lock chambers and to 31 ft. at their side walls.

In this plan the bottom of the summit level is fixed at 68 ft. above mean tide, the depth which it was believed could be reached in the time which would be required to complete the rest of the work. In consequence this plan appeared to the new company to present the advantage of equalizing the delays of the work of excavation on the one hand and of those of permanent construction on the other, but the experience acquired by the company at the central cut as to its geological consistency and stability combined to induce the belief that the central cut could be securely carried to a greater depth if it were possible to accomplish it within the time demanded by the concession to complete the rest of the canal.



CULEBRA CUT, LOOKING NORTH.

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The plan of the canal as projected by the new company exactly follows that adopted by the old company and thus utilizes the extensive excavations made by the latter. The essential difference between the two plans lies in this: The old company sought to achieve a canal at the ocean level but near the end of its existence it decided to avail itself provisionally of a plan with locks which subsequently was to be transformed into a canal at the original ocean level. To reach such a solution the old company had to overcome two considerable difficulties—the excavation of the great central cut to a depth of 129.5 ft. below the sea level and the creation of a new bed for the Chagres outside of the canal which for a long distance occupied the natural bed.

This was the state of affairs when the Spanish-American war broke out and changed entirely the political aspect. At that time Senator Morgan was eloquently urging the construction of an Isthmian canal along the Nicaragua route. It would, of course, be impossible for any private company to compete with a nation so rich and powerful as the United States in an enterprise of this character, and overtures were accordingly made by the French company to sell its proper-

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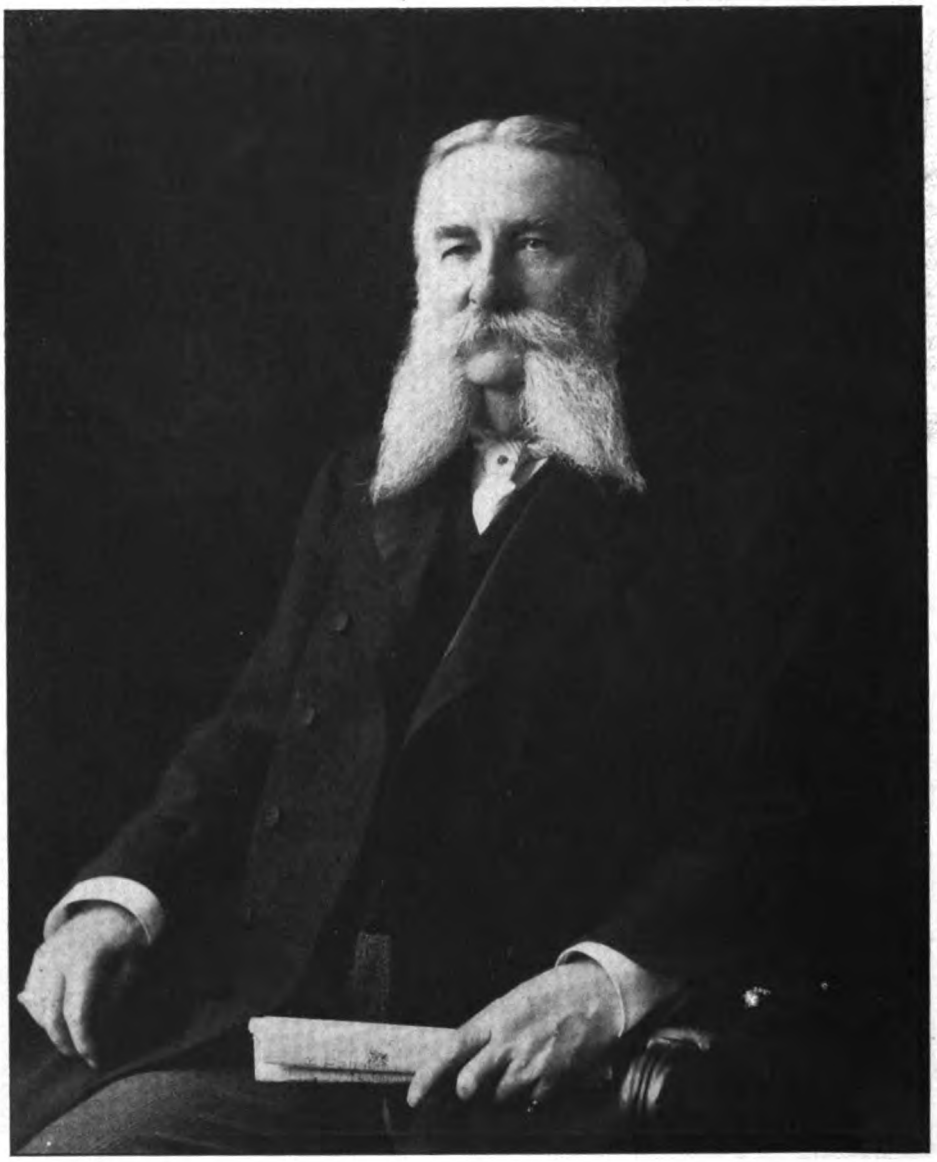
ties to the United States. When the price was reduced to $14,000,000 Senator Hanna convinced the senate that it was a sensible thing to do to accept it. Negotiations were rapidly concluded and the United States is now vigorously prosecuting the undertaking.

PAST AND PRESENT CONDITIONS IN THE ISTHMUS

Consul Gudger of Panama in a recent communication to the state department, presented an interesting picture of the past and present conditions in the Isthmus. It is seen that there is really nothing to be feared from the climate if a man exercises the ordinary care that one should exercise in the tropics.



REAR ADMIRAL JOHN G. WALKER, CHAIRMAN ISTHMIAN CANAL COMMISSION.

"The most ardent friend of Panama does not regard it as a paradise or even as a health resort. That it is not such a death pool as most people at a distance think is equally certain. For hundreds of years no regard has been paid to sanitation. That under such circumstances there should be a large death rate is not more than should be expected. Sometimes one is inclined to wonder how it is that anyone can live, considering the surroundings. The death rate in Panama during the six months ending July 1, 1904, was fifty-four in 1,000, calculating the population of the city at 20,000 people. The natives claim that there are here at least 25,000 inhabitants, while the census which is now being taken would seem to indicate that it is even less than 20,000.

"During the construction of the Panama railroad and when work was being pushed by the French canal company, the laborers were badly housed, poorly fed, and exposed to all kinds of inclement weather. No wonder the record was made that for each cross-tie in the Panama railroad the life of one of those who aided in its construction was lost. With good, comfortable quarters, pure water, constant warfare on the mosquitos, abundance of healthy food, and enforcement of strict sanitary measures, the death rate will undoubtedly be greatly reduced. All these things will be provided for by the Canal Commission, which seems to have begun work in earnest, and those who have watched the progress so far have little doubt that within the shortest period possible all that can be done on the canal will be accomplished.

"The climate differs in various parts of the republic. In Panama and Colon the temperature is approximately the same and ranges from about 65° to 98° F.; the average is perhaps 80°. The nights are, as a rule, cool and pleasant. The rainfall in Colon is from 82 to 155 ins., the average being about 125 ins. In Panama the rainfall is from 47 to 90 ins., the average being 70 ins. The hilly section is cooler and has less rainfall. The seasons are divided into the wet and dry. The dry season, which is called the summer, begins in December and lasts through April, the remainder of the year being the rainy season, or winter. The commission is not only doing a great deal in the way of sanitation, but is likewise preparing for sickness. Two large hospitals will be conconducted — one in Panama and the other in Colon — and stretching across the zone will be some eighteen others, which will be feeders to the principal ones. Panama, Colon and the entire zone will have fresh, pure water, the supply of which will come from streams in the adjacent hills."

When Rear Admiral Walker returned from the Panama canal zone lately he said that the United States government would maintain two open ports in the canal zone despite any protests which might be made by the Panama government. These ports are Ancon on the Panama side of the Isthmus and Cristobal near Colon. Goods brought through these ports in the zone will not be permitted to enter Panama territory.

The Isthmian Canal Commission has made large purchases of lumber during the last few months, having bought about 6,000,000 feet in all.

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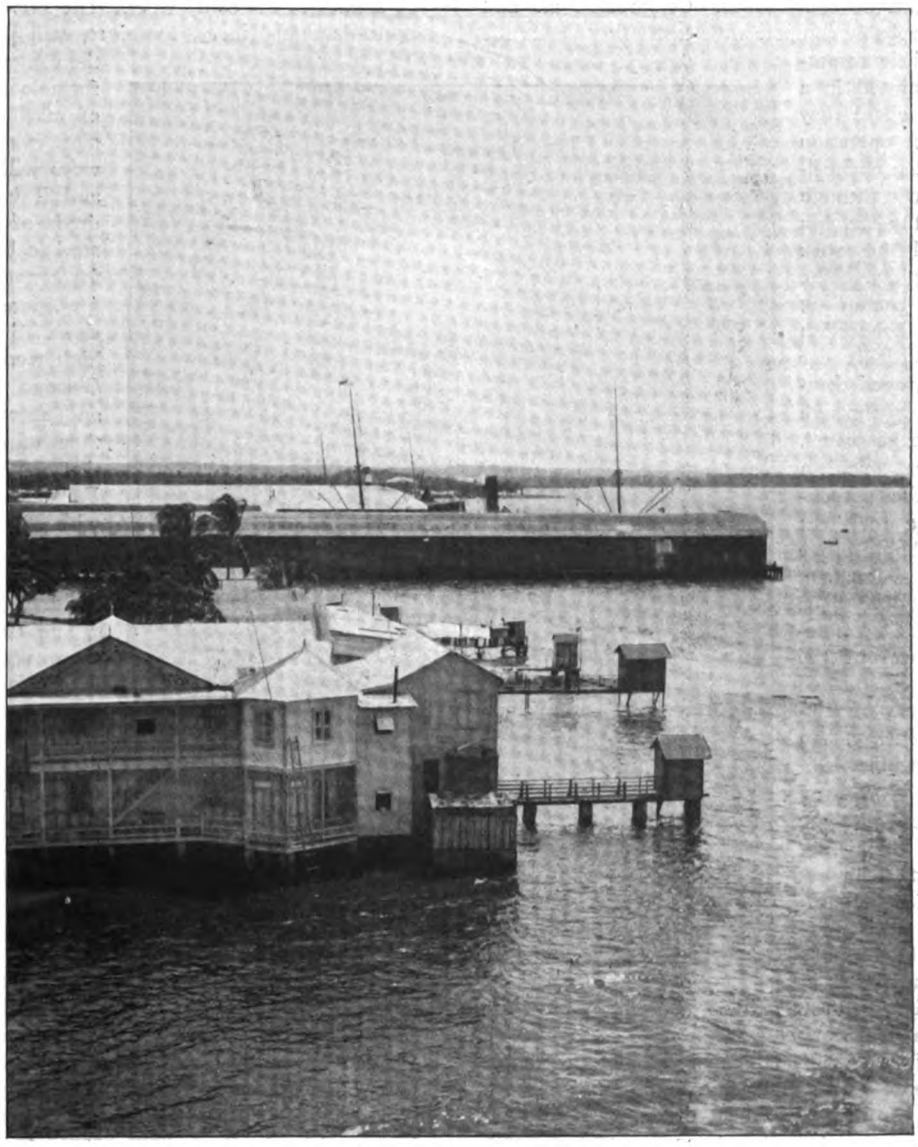
Supplies for Panama

By GEORGE E. WALSH.

The purchasing of tools and large machinery for digging and finishing the Panama canal will probably not begin for several months yet, but the preparations for this important work is now getting under way, and engineers and manufacturers are displaying a good deal of interest. The Isthmian Canal Commission in its early report intimated that it would require two years of preparation for the work; but this time is likely to be cut down nearly one-half. The more recent estimates place the time for preparation at one year, and from six to seven years to complete the whole enterprise. Unusual machinery must be made and shipped to the Isthmus before real excavating begins, for while the work at Panama is not difficult in many ways the great distance of the canal from all manufacturing centers makes it quite necessary that a complete plant, capable of self-sustaining work, should be prepared and shipped in advance. The interruption of work through the breaking down of important machines was one of the greatest drawbacks to the old French company. Frequently the delays caused by broken machines extended from six months to a year.



COLON, LOOKING NORTH.

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The American machinery will be ordered and shipped for the most part in duplicates. Repair shops capable of sharpening, mending, and almost manufacturing new parts of the machines will be established on the Isthmus to prevent any possible delay. At the Culebra cut some 43,000,000 cu. yds. of soft rock must be removed, and it will be necessary to blast and cut it away by modern American drills and channeling machines. To do this work satisfactorily and quickly a good many of the machines developed by the engineers in charge of the Chicago drainage canal will undoubtedly be employed.

According to the estimates recently placed upon the French machinery abandoned along the line of the Panama canal the American company will take over about two million dollars' worth, but which was originally listed at $29,000,000. This remarkable deterioration in value is due to the climate of the Isthmus and to poor care on the part of those in charge. The old machinery that is already on the ground that can be made at all available for the new work consists chiefly of harbor dredges, old scoop shovels, drilling machinery, tracks, dump cars, hospitals, and shops. The actual machinery of modern type must all be purchased in this country and shipped south within a year.

The constructive work on the Panama canal has followed closely the methods that De Lesseps employed in his work of building the Suez canal. In fact, the original French company, and its immediate successor, developed no new methods or machinery, but simply copied those which prevailed along the line of the Suez. At that time engineering methods had not advanced with the modern strides that have subsequently marked its progress, nor had machine manufacturers placed on the market the wonderful products of their skill which today simplifies digging processes.

Machinery will do most of the work on the canal. The work can today be accomplished in the same time with about one-half the men formerly required. The modern steam shovels, channeling machines, dredges and derricks all work with such automatic regularity that a single operator can remove more earth or rock than a dozen could do with the antiquated types of the old French company.

American engineers are eager to make practical comparisons between European and American methods of work, and

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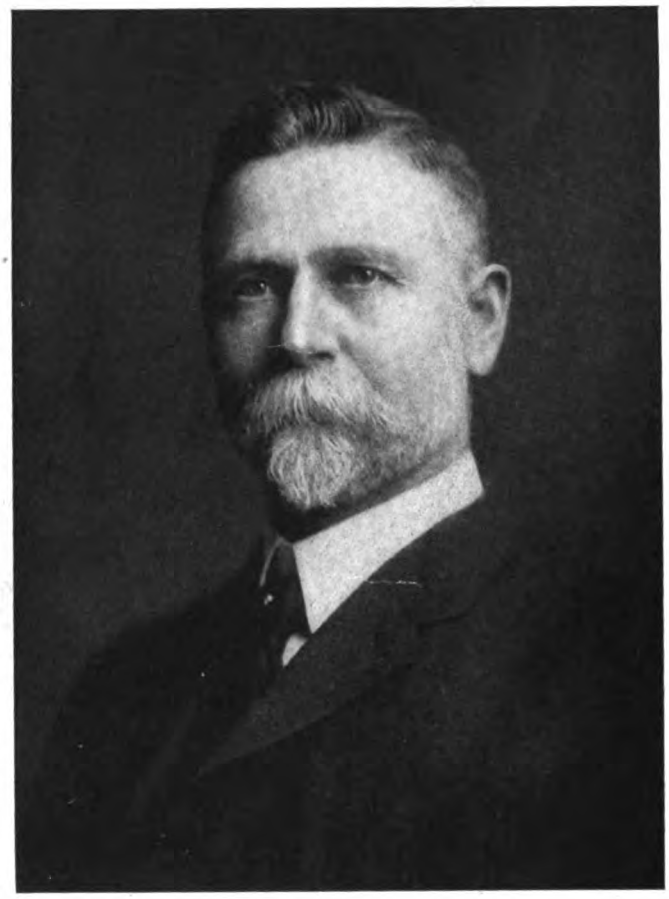
the Panama canal will undoubtedly attract world-wide attention in this respect. Not only will American engineers and contractors do the work, but American made and designed machinery will be employed almost exclusively. How great an advancement has been made in the development of tools and machines will be apparent when the giant plant is once established there.

As the Culebra cut is the only part of the canal that will actually require drilling and blasting through rock, this feature of the work will not be conspicuous. Compressed air and electric drills will probably compete with each other under the tropical sun, and their respective merits demonstrated in a part of the world where they have rarely been in operation before. The American channeling machines will cut through the soft rock on the Culebra cut with ease, and the work should progress rapidly. The advantages of the channeling machines used in connection with air or steam drills for blasting were pretty well demonstrated in cutting through the Chicago drainage canal. The former gives such a smooth finish to the perpendicular side of the rock cut through that they should prove of particular value in Panama. A clean cut must be made across the mountains at Culebra, and the removal of the rock must be accomplished with the least amount of friction and outlay of energy. An army of drilling machines, followed by blasters to blow away cross-sections, should prepare the way for the channeling machines so that a clean cut can be made quickly and effectually.



MR. CARL EWALD GRUNSKY.

Steam dredges of enormous capacity must be purchased in this country and shipped to the Isthmus, for the sea-level work on either end of the Panama canal is not a simple problem. The loose silt and fine mud flows back into the channel so rapidly that dredging operations by the French proved extremely expensive and difficult. The sea washing into the canal quickly destroyed the work accomplished by the dredges, and without modern methods of preventing such a recurrence progress would be slow. American steam dredges with six-yard dippers should clean the harbor channels of silt and sand, while the "sand-suckers" or hydraulic dredges will be needed for such parts of the sea-level work where the silt is fine and annoying. Scores almost of such dredges on either end of the canal will be needed to keep the harbor clean, and to finish the work up quickly and in time. The shipment of these enormous steam dredges to the Isthmus will begin almost with the opening of next spring or summer, and by another winter they should be in full operation.

At present the purchasing of machinery and tools for Panama is limited chiefly to those necessary for improving the sanitary condition of the canal zone. Complete and perfect sanitation and disinfection of the camps, laborers' quarters, and shops will precede everything else, for the terrible mortality which marked the progress of the French company is to be avoided if possible. It is realized by the American engineers that the soil is full of fever germs, and that as soon as the surface is disturbed they will be released and general sickness may prevail. By careful sanitary and disinfecting processes in advance this danger can be minimized if not almost entirely eliminated.

The equipment of the Panama plant for dredging will be of the most complete character, for time is money in the construction of it, and every penny saved in handling a cubic yard of material may mean a profit of hundreds of thousands of dollars to the contractors. The shipment of only the most up-to-date machinery, therefore, will pay, and the plans of the company so far as they are formulated include only types of machinery that are of the most efficient character. Cableways will be used extensively, and it is estimated that hundreds of miles of 2- and 3-in steel cables will be required for connecting the steel towers for operating the scoops and skips. Steel towers 70 to 93 ft. high were used in digging the Chicago drainage canal, with an extreme width between them of 700 ft., but it is likely that some of the spans used at Panama will exceed 1,000 ft., with steel towers for the support of the steel cableways reaching a height of at least a hundred or more feet.

The complete equipment of these veritable steel cableway suspension bridges, with all their paraphernalia for carting rock and dirt back from the canal, will be rather costly, but each plant should save thousands of dollars to the contractors. One of the problems offered for solution in digging the canal across the Isthmus is to carry the excavated material a long distance back from the ditch at the least possible outlay of time and labor. The French company used small Belgian locomotives and trains of dump cars for this purpose, but while such trains will be required and used by the American contractors the overhead cableways will be more largely utilized. They have proved to be the most effective machines for carrying away to a distance rocks and soil dug from a large canal. A good deal of money is saved by this method owing to the less number of operators required. A single man standing on his platform can operate the whole mechanism, controlling the skip as easily as if he stood at the bottom of the ditch to watch every movement of the men. By electrical signals the operator knows exactly when to hoist, lower or to dump.

The operation of these huge steel towers on platforms mounted on movable trucks increases their effectiveness nearly 50 per cent. They move along the sides of the canal as the work progresses, and there is little delay occasioned through shifting the machinery. Only common, unskilled laborers, who are hardened to the climatic conditions of the Isthmus, would be needed to load the huge steel box at the bottom of the canal. The modern skips are immense steel boxes capable of carrying away 80 to 90 cu. ft. of material. Where electric motors are employed they move back and forth across the steel suspension bridge at the rate of 1,000 ft. per minute, working with great regularity and accuracy.

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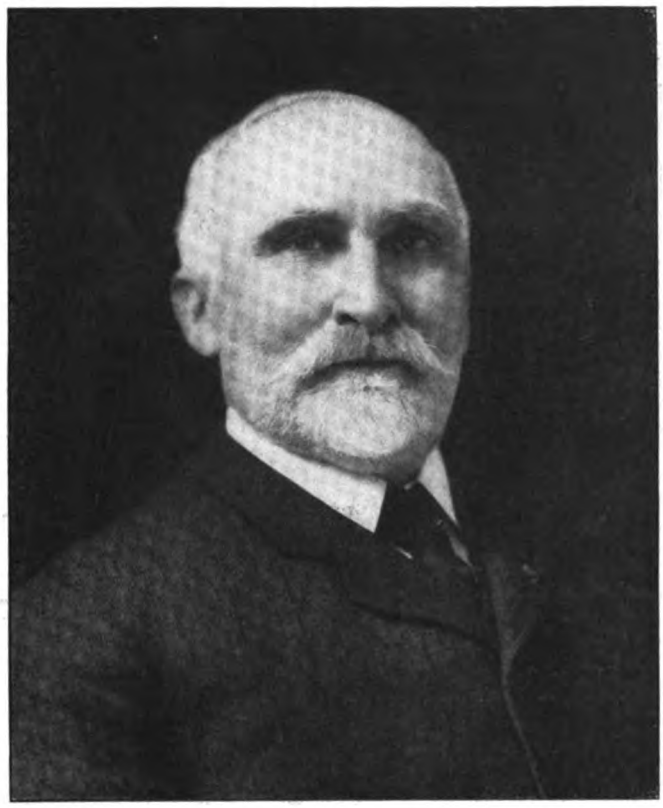
The whole course of the canal will be cobwebbed by steel suspension bridges of this character, and the outlay for them will run up into three figures before a single foot of soil is moved. The removal of the material from the line of the channel must in some places prove a little difficult, for it will be necessary to carry it over high heaps of debris and hills, but in other sections it can be piled up on the embankments.

Steam shovels, derricks and cantilever conveyors will be needed in great numbers. The American steam shovels should cut into the soft, sandy, silty soil of the Isthmus rapidly and easily. There is no engineering problem presented here in the way of breaking and tearing up a hard, tough soil. There are no rocks and hard clay over most of the section of the canal for the shovels to attack. Few of the modern steam shovels with their dippers fringed with steel tusks to cut into hard clay will be needed. The French company have already exposed enough of the subsoil of the canal to make known what sort of soil is to be encountered. The improved steam shovels have a good deal of mechanism that requires experienced and skilled operators, but one man of this character can do the work of a whole score of common laborers armed with old-fashioned instruments.



COL. FRANK J. HECKER.

Cantilever conveyors and revolving derricks are all a part of a modern canal dredging company's plant. The newest cantilever conveyors are nearly 400 ft. long, carried on a platform mounted on wheels, with a steel tower 60 to 70 ft. high. One of these machines is capable of lifting 800 to 900 cu. yds. of material in ten hours. With one long arm swinging over the "spoil" bank and the other dipping in the bottom of the canal, the machine is never idle a minute, and the workmen are kept busy filling and unloading the cars.

Revolving derricks working on turntables and mounted on wheels perform their work in other lines almost as effectively as the other machines mentioned. They will prove of special value in moving and setting up the great machines. The installation of the whole plant is an engineering feat that offers many preliminary difficulties. The character of the soil and the level of the canal embankments must be considered in connection with this wholesale employment of portable machinery. The tracks which must first be laid along the embankments cannot be hastily and clumsily built, for the giant machines that must travel on them require a firm and level foundation. Nearly all of the huge steam shovels, dumps, channeling machines, and derricks will be mounted on trucks which travel on the tracks.

The preliminary work will include the construction of standard size tracks along the route for the accommodation of the machines, and the erection of repair and tool plants at convenient places for forging and sharpening instruments. The whole line of the canal will in reality be turned into an immense workshop, with electric and steam power employed constantly for a thousand and one small things that come up.

Possibly no other modern enterprise will compare in size and equipment with the American Panama plant when it is once installed and ready for operation. With his machines, supplies, workmen, and commissary department thoroughly equipped, the contractor or engineer can proceed to construct one of the greatest waterways the world has ever attempted to build. To the genius of the American engineers full credit must be given, but their methods of work, and the machinery used, will attract fully as much attention as the canal itself when finally completed.

PERSONNEL OF THE COMMISSION

While the members of the Isthmian Canal Commission are well known it might not be amiss to give brief sketches of them in conjunction with their present work. The members of the commission are: Rear Admiral John G. Walker, U. S. N. (retired); Maj.-Gen. George W. Davis, U. S. A. (retired); William Barclay Parsons of New York; William H. Burr of New York; Benjamin M. Harrod of New Orleans; Carl Ewald Grunsky of San Francisco, and Frank J. Hecker of Detroit. From the standpoint of general balance it would probably be impossible to get a more competent commission than this. Those among them who have not carried to completion engineering projects of great magnitude, have had equally important training along executive lines so that assurance may be had that both in a scientific and business way the construction of this great ditch will be well managed.

Rear Admiral Walker, who is the chairman of the commission, is not, technically speaking, an engineer though he has had much to do with large engineering operations. It may be said that he has made a specialty of the construction of canals for he has been associated with canal inquiries for a great many years. He was a member of the old Nicaraguan Canal Commission and was also appointed by the late President McKinley to investigate the Panama, Nicaraguan and other proposed routes for a canal. It was in January, 1902, that Admiral Walker sent a report to the president in which he stated "that the most practicable and feasible route for the Isthmian canal, under the control, management and ownership of the United States, is that known as the Panama route." This report was the outcome of the most consummate diplomacy on the part of Rear Admiral Walker in dealing with the members of the new Panama Canal Co., whereby they reduced the price for their franchise and equipment from $109,000,000 to $40,000,000 and thereby made the adoption of the Panama route a sound business matter.

Mr. William Barclay Parsons, is an engineer of great distinction. It was he who undertook the construction of a railroad in China for a syndicate headed by the late Senator Calvin S. Brice. He will be chiefly remembered, however, as the designer of the subway in New York city for the Rapid Transit Commission, of which body he has for several years been the chief engineer. Mr. Parsons' work upon the subway in New York was responsible for his appointment as a mem-

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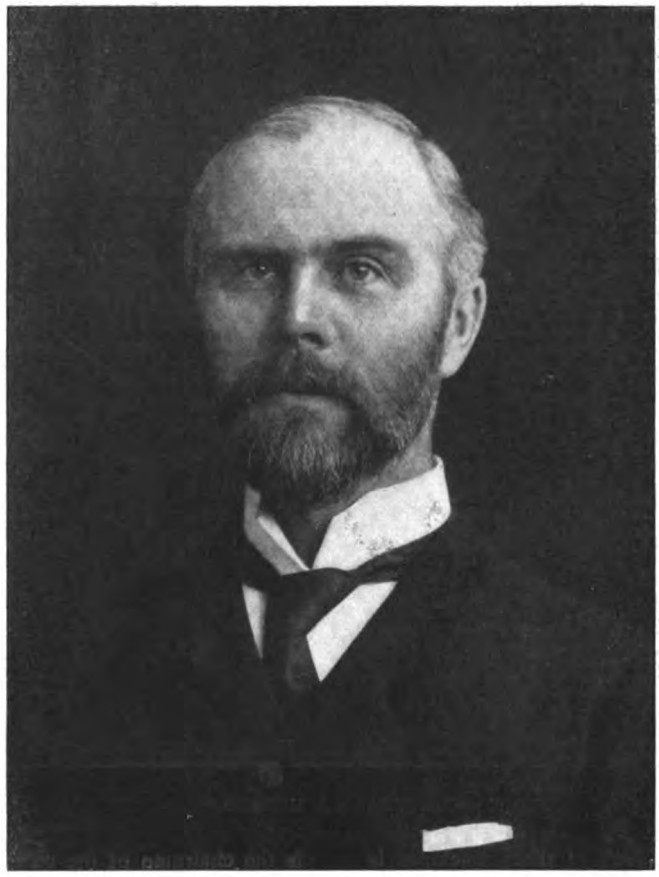
ber of the advisory commission which is to investigate and report upon the interurban traffic of London which has made the problem of transportation one of the studies of his life.

Mr. William H. Burr is an expert of canal problems and has served as a member of both the Nicaraguan and Isthmian Canal Commissions. He has spent a great deal of time on the Isthmus and is thoroughly acquainted with the situation. His clear testimony was much valued at the time the interoceanic committee was investigating the desirability of the various routes.

Gen. George W. Davis occupies a dual position upon the commission. He is not only an engineer of ripe judgment but he has had long experience as the governmental head of the outlying possessions. It was therefore a wise thing on the part of President Roosevelt to make Gen. Davis the civil head of the canal zone. While he has only recently assumed direction of the civil government of the zone he has already demonstrated his ability to manage it with fairness and firmness. In this he has been aided by his long experience in Cuba, Porto Rico and the Philippines.

Mr. Benjamin M. Harrod and Mr. Carl Ewald Grunsky contribute greatly to the value of the commission by the diversity of their experiences. Mr. Harrod has had much to do with the improvement of the internal waterways of the country and has charge of exceedingly important operations in the Mississippi river, while Mr. Grunsky has made a speciality of mining and the handling of earth and rock.



MR. W. B PARSONS.

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Col. Frank J. Hecker is a business man of much experience and invaluable upon a commission of this character which has to handle not alone enormous sums of money but an army of men as well. He has been all his life associated with large operations, and during the Spanish-American war was director of transportation for the government in the war department.

Mr. D. I. Murphy, the secretary of the commission, completes the group of able men. He has had wide experience and is well versed in the subject-matter of the present undertaking.

The commission paid its first visit to the canal early in April, or within a month after the confirmation by the senate. They went over the ground very thoroughly with special reference to work already performed with a view of verifying the maps and drawings made by the French company. These maps are of most elaborate character and represent an expenditure of a large sum of money. But the commission discovered that some of them were entirely unreliable, and that little reliance could be placed upon their topography except at the immediate axis to the canal. The question, therefore, of an accurate survey is the first consideration of the committee and that is now being made under the general direction of Chief Engineer John F. Wallace.

COMMERCIAL EFFECT OF PANAMA CANAL

No one who is at all informed pretends that the Panama canal can be now or for a generation to come commercially profitable. Under the present estimates the cost of the canal to the United States will not fall below $200,000,000, which, with accumulating interest for the next ten years, will easily reach the figure of $250,000,000. Calculated at the modest rate of 3 per cent, this would require a revenue of $3,500,000 annually to meet interest charges, but to this sum must be added the cost of maintenance and operation which will at the least estimate be several millions more. Therefore, in order to be a paying institution at all, the earnings of the Panama canal will have to be very large. In contrast with the sum to be earned in order to meet fixed charges, the total of 300,000 tons of freight which is now annually hauled at a considerable profit by the Panama railroad is an insignificant item. In addition it must be borne in mind that a considerable traffic now goes around the Horn to avoid these very charges of the Panama railroad, so that indeed not much is to be expected from that source.

Again the primary object of the canal is to save distance. Whatever traffic therefore can find shorter routes than Panama will not use the canal. Such traffic is the greater part of the commerce between Europe and Asia and Africa. The distance from London to Singapore is 7,400 miles and to Yokohama 1,700 miles less by Suez than by Panama. It is 1,200 miles shorter from London to Sydney, New South Wales, by Suez than by Panama. It cannot be expected therefore that Panama will diverge any part of this traffic. It will, however, extend the markets especially of the Atlantic coast cities of the United States. It will open up hitherto inaccessible territory on the western coast of South America. While this will aid American manufacturers its benefits to the American ship is at present problematical. There are no steamship lines extending from United States ports to the eastern coast of South America which requires no canal to reach. It may, however, by widening the available market make it possible to project a steamship service should congress come to the rescue of American shipping in general. The canal affords a favorable route for the United States to Japan and to the northern ports of China, to Australia and to New Zealand and as well, of course, to all the ports of the western coast of South America. It affords also to Europe a nearer route to the Pacific shores of North and South America, the South Sea islands and New Zealand. The Walker commission estimated that the traffic utilizing the canal at its opening would be approximately 6,700,000 tons. The present tonnage that passes through Suez is something like 13,000,000 tons. The commerce passing through the Sault Ste. Marie canal is 35,000,000 tons annually, so that it can readily be seen that for some years at least the importance of the Panama canal will be more strategical than commercial.

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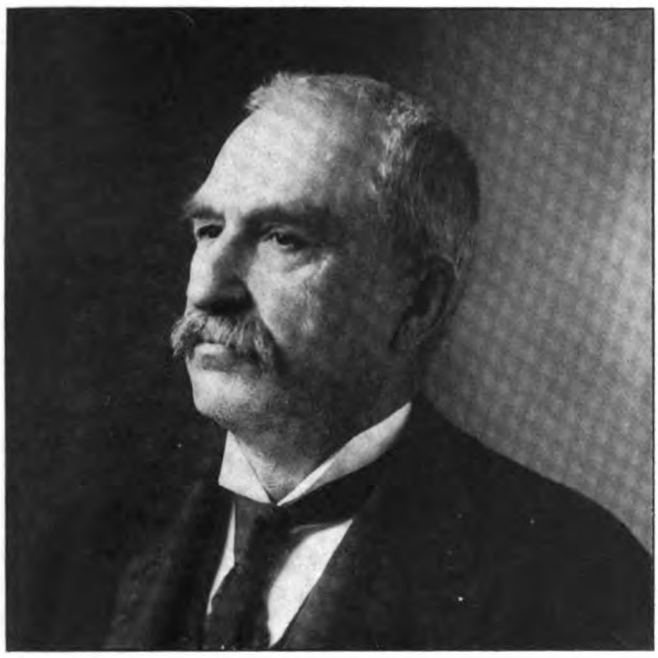

GEN. GEORGE W. DAVIS

PANAMA CANAL AND LABOR

About 2,000 men are at present employed on the Panama canal; 500 of them are engaged in the Culebra cut and the other 1,500 are employed in sanitary work and surveying. The labor question of course is an important one but it is quite clear that it does not present the obstacles that have been popularly imagined. There will be no difficulty in procuring labor in sufficient quantities to dig the canal. The experience of the original canal company cannot be taken as a criterion

MR BENJAMIN M. HARROD

for present conditions. If it were true at that time that for every cross-tie laid the life of the man that laid it was lost it will not be true now. Excellent care will be taken of the workmen. It is quite likely however that unskilled labor will be drafted from Jamaica. The Jamaica negro speaks English and is acclimated to such climate as exists in the Isthmus and is moreover credited with being sober and industrious. They can also be trusted with some of the higher branches of work, such as firemen, baggagemen and brakemen, and also enginemen on switch engines. Dollar for dollar the Jamaica negro has the reputation for performing as much work as any

MR. WILLIAM H. BURR.

class of labor in the United States. There has been talk of importing Chinese, Japanese and even coolies from British India, but it is not likely that any of these means will have to be resorted to, as the aggregate number of men that will be employed in the canal at any time will not exceed 10,000. This will mean that the transient population of the zone during the period of actual construction will be probably 50,000.

MR. D. I. MURPHY, SECRETARY OF THE COMMISSION.

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THE ISTHMIAN CANAL COMMISSION.

Standing from left to right: W. H. Burr, B. M. Harrod, C. E. Grunsky. Sitting left to right: Gen. Geo. W. Davis, Rear Admiral John G. Walker, Col. Frank J. Hecker and Mr. W. B. Parsons.

[*Photo by Clinedinst.*

COMMERCIAL ASPECT OF PANAMA CANAL

Editor Marine Review.—Replying to yours of Sept. 6 for an expression of this company's views on the above subject, I beg to submit the following:

Question—What will be the direct benefit to the American ship from your point of view?

Answer—There will be certain benefits to the American ship, provided the foreign bottom is not placed on an equality in the Isthmian trade with the American bottom.

Q.—Will it, in your opinion, stimulate the trade of the Atlantic seaports with the seaports of the west coast of the American continent—north and south?

A.—Doubtless there will be a stimulation of trade when the canal is open, and possibly during its construction, on account of the material which will be required by the contractors performing this work.

Q.—Will it have an appreciable effect in restoring the American flag upon the high seas in the foreign trade?

A.—It will have just the opposite effect unless all the benefits accruing to the American interests in the Panama canal zone are held exclusively to American bottoms, so far as trade to and from those ports to the ports of the United States are concerned.

Q.—Do you think that the trade of the Panama canal zone should be reserved to the American ship—that is, should it be included in the coastwise service—the canal zone being treated as American territory?

A.—Undoubtedly it should be reserved to the American ship for the American ship is a part of the United States. It is a taxpayer contributing to the support of the United States and to its government; and if the taxpayers build this canal, then as one of the taxpayers the American ship should participate in any benefit accruing from the enormous expenditure made by the United States government in this work. If the benefits are to be given to foreign bottoms and the canal zone thrown open to all nationalities and to ships of all flags, it is my opinion there will not be an American ship in this trade and that instead of the construction of the canal assisting American bottomry, it will undoubtedly drive the American vessels now in the Mexican and Central American trade out of business, as with the wages paid on these ships they could not possibly compete with the ships of other nations.

Yours very truly,

JAS. H. DEWSON,
Agent Portland & Asiatic Steamship Co.

Col. John Biddle, engineer commissioner of the district of Columbia, recently returned to Washington from a visit to Panama. He says that there was not a day of the two weeks that he remained there that the temperature rose higher than 80°. The nights were cool and there was a comparative absence of mosquitos. There were no cases of yellow fever, smallpox or the plague on the canal property, and he highly recommended the excellent work that the marine hospital service is doing.

The city of Panama, which has been credited with being one of the most unhealthful cities in the world, will unquestionably become more habitable than other places in the tropics. The Isthmian Canal Commission is now giving the people a pure water supply and has undertaken the construction of an elaborate system of sewerage.

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CHIEF ENGINEER WALLACE ON PANAMA CANAL

It was at great personal sacrifice that Mr. John Findley Wallace, the general manager of the Illinois Central railroad, accepted the position of chief engineer of the Panama canal. He had been offered a place upon the commission itself but had declined and it was only at the earnest request of President Roosevelt that he later consented to be chief engineer. But the nation has the assurance under Wallace's direction the engineering work will be done as well as it can possibly be done.

Mr. Wallace was educated as an engineer in Monmouth College, at Monmouth, Ill., which was established by his father, Rev. David A. Wallace, who was its first president. In 1869 he entered the service of the Carthage and Quincy railroad as a rodman and was assistant engineer in the United States engineering corps at Rock Island from 1871 to 1876. During this time he excavated a channel through the St. Louis chain of rocks by machinery of his own design and construction, an undertaking in which the government previously had failed.

MR. JOHN F. WALLACE, CHIEF ENGINEER PANAMA CANAL.

In 1879 Mr. Wallace was appointed chief engineer for the Peoria and Farmington railway, which was located, constructed and operated by Mr. Wallace as superintendent. Later he was in charge of construction for the Iowa Central and built several great bridges. During 1886 he was engaged as assistant engineer of surveys for the Union Pacific, and later went with the Santa Fe in charge of a system of improvements on the Mississippi river, which should control the river above the Sibley bridge, which bridge he also constructed. Mr. Wallace later constructed the joint entrance of the Illinois Central and Santa Fe into Chicago and the Alton terminal improvements.

In January, 1891, Mr. Wallace was selected to take charge of the Illinois Central's world's fair business, and worked out and put into operation a plan that became the wonder and admiration of the engineering and railroad worlds. His work was rewarded by the appointment to the position of chief engineer for the company, and as such, and later in the positions of assistant to the second vice president, assistant general manager and general manager, he had charge of the vast improvement and reconstruction work which has placed the Illinois Central in the fore rank of the big western railway systems.

Chief Engineer Wallace recently returned to the United States after a whole summer spent in the Isthmus making personal observations and outlining the work of the various engineering sections. In an interview upon his return he stated:

"During my three months' stay in Panama I completely covered the entire strip, which is about 10 miles wide and 47 miles long, at least twenty times, making thorough observations. At present there are about 1,500 men in the field. Of this number 500 are in the sanitary department under Colonel Gorgas, who is assisted by Colonel Le Garde, Major Ross and Major Carter, the last-named being chief quarantine officer.

"There are at work six divisions of the engineering corps, each in charge of a resident engineer, and these report to me as chief engineer. There are subordinates in each engineering corps, such as assistant clerks and superintendents, while the rest of the men at work in connection with the canal are laborers. The engineering and clerical departments are almost entirely Americanized, and nearly every arriving steamer brings fresh additions from the United States. The majority of the common, as well as a few of the skilled, laborers are English-speaking negroes from Jamaica.

"The reason that Panama has had a bad name in the popular mind is owing to the fact that until recently the heterogeneous population has paid but little attention to the ordinary laws of health. Under such conditions it was natural that those that drank hard, were not careful as to food, did not boil or sterilize their drinking water and otherwise disregarded the ordinary hygienic precautions, should find the country unhealthful. Most of the men who now hold responsible positions in connection with the canal work are sober, industrious and ambitious, many of them being college bred. They find the health conditions in Panama excellent, and sickness among them bears but a small per cent to the total now inhabiting the Isthmus. The mean temperature this summer was about 84°, and I do not remember having passed a summer in the United States when the weather was more pleasant than it has been on the Isthmus.

"The sanitary corps has given especial attention to stamping out malaria and yellow fever. Of all the men at work on the canal this summer but two died of yellow fever, and but one of them, a man sixty years old, was in the employ of the government. The idea that yellow fever is prevalent in the Isthmus is erroneous. It, as well as the malaria fevers prevalent in tropical countries, is being eradicated by the scientific measures brought to bear by the sanitary department of the Isthmian government. Of the work done by the French company before the United States bought the canal, perhaps 15 per cent can be utilized. It all depends upon the plan finally decided upon for the completion of the canal. Whether the canal is to be at sea level, or 30, 60 or 90 ft. above sea level, will not be determined until the surveys of the engineers now in the field have been completed. Some of the machinery turned over to the United States by the French company is still useful, but much new machinery must be bought, as a great deal of that in use by the Frenchmen is either worn out or not up to the requirement of modern methods.

"The preliminary work of thoroughly surveying the canal route with a view of determining at what level the canal is to be cut and the exact line it will follow will consume all the

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time until the end of 1905. By the spring of 1906 I expect to have the campaign entirely mapped out and the actual digging of the canal in actual progress. Then it will take eight years to complete the work. The line already marked out by the French company will be followed pretty closely except that wherever possible curves will be straightened. The line of the canal will be for about 25 miles along the Chagres river, then along one of the branches of the Chagres, passing through the cut among the hills known as the Culebra cut, about ten miles from Panama, and thence on by the Rio Grande river to Panama bay. The completion of the work will cost $150,000,000. This sum added to the $40,000,000 paid to the French company for the canal property and the $10,000,000 paid to the Panama government for the grant of land will make the total cost of the great waterway $200,000,000. I found the natives friendly toward the United States, although some of the thrifty shopkeepers and dispensers of high living seemed to be a little put out when they found that the Americans were not as free spenders as the French had been. The English language is fast becoming the predominant tongue in the canal zone, although in the hotels and on the plazas German, French and Spanish are heard also. Many of the natives of Panama of the higher class are sending their children to the United States to be educated, and this is aiding in the Americanizing of the Isthmus."

BUSINESS OPPORTUNITIES IN PANAMA

Mr. John Barrett, minister to Panama, after a month's investigation on the Isthmus and consultations with Chief Engineer Wallace and the members of the Isthmian Canal Commission submitted the following memorandum to the department of state concerning business openings and conditions of employment on the Isthmus:

"First. No man seeking a position as clerk, stenographer, typewriter, engineer, mechanic, foreman, or any similar class of labor which the average American will be willing to perform, should come to the Isthmus in expectation of securing a position unless he has made previous arrangement for employment, or has sufficient funds to pay his expenses in Panama and of return to the United States if he finds no opening. More men of this kind are now coming to Panama and Colon than there are positions to be filled. The cost of living is very high, prices have increased nearly 300 per cent in the last six months, and there is a great shortage of cheap and wholesome lodging and board accommodations.

"Second. While Panama and Colon, as well as towns in the zone and in the interior of Panama proper, are sure to experience a considerable measure of material and industrial progress through the excavation of the canal, there are not, at present, many opportunities for the establishment of new mercantile, business and professional firms, and there should not be an inrush of merchants, business and professional men in the expectation of finding considerable and ready openings for establishing themselves. It would be best for men desirous of locating here in business enterprises, first, to come and look over the field before finally closing up their offices in the United States.

"Third. It is the consensus of opinion among members of the commission and others who have studied the situation that both Americans in the United States and Panamanians here have greatly exaggerated the increase of population which will result from the construction of the canal and of the number of men who will be employed by the commission for the carrying on of the undertaking. It is not probable, in view of the modern systems to be employed in construction, that there will be at any time more than 12,000 or 15,000 men directly employed as ordinary laborers along the line of the canal. If we add to these some 5,000 to cover the small number that will bring their families, and the element that might be termed camp followers, and if we further add 5,000 more who will represent high class employes and all kinds of business and professional men who may come here on account of the work, and all others employed, we have, at the outside, an increase only of 25,000 people. This number, moreover, will not be coming here all at once, but gradually through a period of years, and as they may be required.

"Fourth. All estimates to the effect that some 40,000 to 60,000 people will be brought to this Isthmus through the construction of this waterway are exaggerated, and calculations on such a basis will prove most deceptive. As the latest estimate of population of Panama proper, according to Whittaker, is 340,000, this added 25,000 through a period of years is not sufficient to create any great 'boom,' as that term is commonly used. There is not yet any real 'boom' in Panama city, in Colon, or in the zone, but rents for houses, stores and offices have doubled and tripled during the last few months, and are now almost exorbitantly high. In fact, the Panama landlords are, some of them, so unreasonable in their charges that there is danger of their driving business from Panama city into the neighboring zone. The United States, in securing offices for its legation, is as much a sufferer in this respect as any merchant or professional man.

"Fifth. The disagreeable and unhealthy features of the Panama climate have been ridiculously overstated by those who have viewed the situation superficially while passing across the Isthmus in transit, or who have desired to create a sensation. Members of the commission and the minister, who are familiar with other tropical countries, particularly those of Asia, find it much cooler and healthier here than in corresponding latitudes of other lands. The former unsanitary conditions existing in the days of the old Panama Canal Co. might have characterized the construction of a similar work in any other portion of the world, and are responsible also for many of the terrible tales that are now told in the American press. As a matter of fact, there has not been during the months of July and August a single uncomfortable night for sleeping, while the average days have not been hotter than those of New York and Washington in the summer. There has been hardly a single instance of serious illness among the considerable number of young men who are here in the employment of the canal, while the percentage of sickness among the larger group of laborers employed at Culebra is not greater than that upon similar excavating work in the United States. Among the 400 marines located half way across the Isthmus at Empire, there has not been a single death from local diseases, while the percentage of those in hospital is not larger than would be found, for the same number, at the average post in the United States.

"Sixth. There has been only one case of yellow fever in several months, and there is less malaria than is often found in sections of the United States, where there is considerable turning of the soil. The worst portions of the cities of Panama and Colon are much cleaner and more wholesome than the slums of some of our North American cities, and are far ahead of the average Asiatic city located in the tropics. These corrections of overdrawn criticisms of the Panama climate must not, however, be interpreted as meaning that there are not unfavorable features here. They exist, as they do in all tropical lands, and, of course, the conditions of maintaining health and enjoying life are not, by any means, as favorable as those in the average temperate climates. When, however, the present able sanitary corps, who have charge of improving health conditions in the Isthmus have carried out their plans for the improvement of the canal strip and of the cities of Panama and Colon, there is no reason why this Isthmus should not be one of the healthiest places in the world."

The new Panama bonds to be issued to defray the cost of the construction of the canal will bear the likeness of the late Senator Hanna to whose efforts this route was selected.

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NIAGARA IV. BEATS TARANTULA

In an exciting race of 39 miles Howard Gould's twin-screw steam yacht Niagara IV, built by Gas Engine & Power Co., and Charles L. Seabury & Co., Morris Heights, N. Y., defeated Wm. K. Vanderbilt's turbine yacht Tarantula last week. The Niagara IV is a smaller vessel than the Tarantula, but no time allowance was given. The yacht was built last year for Mr. Gould and measures 110 ft. over all, 104 ft. on the water line, 12 ft. 2 in. beam and 4 ft. 2 in. draught. She defeated Tarantula by 3 min. 50 sec. in time and by more than a mile in distance. Niagara IV covered the 30 miles in 1:39:18, which is at the rate of 21.37 knots or 24.575 statute miles an hour. The speed of the Tarantula was 20.65 knots or 23.747 statute miles an hour. An interesting incident of the race was the fact that the little automobile boat Vingt et Un II met them a mile or so eastward to the finish and beat them across the line.

With clouds of soft coal smoke pouring from her twin yellow funnels the black hulled Tarantula ploughed such a big wave in the Sound as she sped away to the eastward that Capt. Fulford gave the Niagara a sheer to port to get her out of it. That was before they had covered the first two miles. Passing Execution light, eight minutes after the start, the white yacht, on the black one's port quarter, began to creep slowly but surely to the front. Soon her sharp bow had overlapped the black hull. Grimy firemen, deep down in the Tarantula's hold, fed the furnaces with more coal, but the small white hull kept creeping up, until, just 24 min. 50 sec. after the start, she had passed her bigger rival.

This was off Matinicock Point. Those on board the Tarantula declare that the water there and at other points in the course was too shallow for her, checking her speed. Be that as it may, the white Niagara, with no sign of smoke coming from her, but with the finger of her steam gauge never falling below 200 pounds, kept there by sturdy firemen trained to work under forced draft, steadily increased her lead. Off Centre Island it was four lengths. Off Lloyd's Neck—about eleven miles on the course—she led by still another length. The bell buoy off Eaton's Neck, which both had to round, hove in sight a few minutes later. They were to leave it to port, and this is how they rounded it:

Niagara IV.....10:05:30|Tarantula 10:08:15

The white boat had a lead on the black one of 2 min. 45 sec., which at the rate of speed meant a trifle more than a mile in distance. The actual time for the nineteen and one-half miles for the Niagara had been 54 min. 21 sec., and for the Tarantula 57 min. 10 sec.

While the Tarantula made a brave effort to overhaul her smaller rival in the stern chase of the return trip, she was unable to decrease the distance, and they finished almost the same distance apart that they rounded the eastern mark. The wind was light from the southeast, the tide the first of the flood, the water smooth and the sky cloudy. The summary follows:

Yachts and Owners.	Start.	Finish.	Elapsed time
Niagara IV, Howard Gould.....9	10:00	10:59:27	1:49:27
Tarantula, W. K. Vanderbilt, jr..9	10:00	11:03:17	1:53:17

Niagara IV won by 3 min. 54 sec. actual or 3 min. 50 sec. corrected time. The prize was a purse put up by the owners of the yachts.

MOTOR BOAT AND SPORTSMEN'S SHOW

The Motor Boat and Sportsmen's Show will be held at Madison Square garden, New York city, under the auspices of the National Association of Engine and Motor Boat Manufacturers and the Sportsmen's Exhibition Co., from Feb. 21 to March 9. Mr. J. A. Dressel, 1135 Broadway, is the general manager of the enterprise. The general plan of the forthcoming show is the result of close observation and experience. Particular attention will be given to the requirements of the marine end of the show. The general plan shows a waterway from 25 to 30 ft. in width forming a loop 500 ft. in length. This will make it possible for all launches to be in operation at the same time. To prevent the ramming of an exhibition the management will construct a projecting division at each end of the water exhibit spaces. On both sides of the waterway will be a promenade 10 ft. wide affording ample opportunity for the public to inspect the launches in operation without in any way interfering with the exhibitions on the floor space. Marine engines and motors will also be in a better location on the island and will therefore be in a position where they can be seen from all parts of the exhibition hall.

AROUND THE GREAT LAKES

The steamer Louise of Sandusky broke her shaft near West Sister island, Lake Erie, last week and was towed to Gilmore's ship yard at Toledo for repairs.

C. P. Gilchrist & Co. of Cleveland have sold the steamer Benton for C. C. Baumhart of Vermillion to Capt. J. W. Willoughby and Richard Baxter of Cleveland.

While going from Niagara to Toronto last week a piston rod on the steamer Chicora of the Niagara Navigation Co. broke. The Chicora will be out of commission for the balance of the season.

The steamer George F. Williams of the Gilchrist fleet broke her steam pipe when about twelve miles out in the lake off Cleveland this week. She was towed into port by the tug Oscar Stedman.

The foundation for the new Dominion elevator to be constructed at Port Colbourne will cost $50,000. The elevator will have a capacity of 2,500,000 bushels. The largest cars can bring grain to this elevator.

Fines of $200 each have been imposed upon the steamers City of Erie and F. B. Morse by the collector of customs at Duluth. Both penalties were the result of violations of rules of navigating the St. Mary's river.

The places of the firemen and oilers on the Booth and White Star Line steamers who quit work at Duluth because they were not given an advance in wages have been filled and there has been no interruption in the schedule of the lines.

A new speed record for a freight carrying steamer has been established by the Western Transit liner Buffalo last week which completed the run from Buffalo to Duluth in 66 hours and 3 minutes. The best previous record for the run by a freight boat was 72 hours.

The Thistle Transportation Co. of Fairport, owner of the steamer Pentland, has libeled the steamer Pewaukee for salvage. Some time ago the Pentland sighted the Pewaukee in a sinking condition off Ludington and took her to Grand Haven. The Pewaukee is owned by Leatham & Smith, Sturgeon Bay, Wis.

The steamer City of Berlin left Detroit for Manitowoc on her own steam Sunday night. She will be in dry dock at Manitowoc during a fair part of the winter receiving repairs to the damages caused by her collision with the steamer Chili about two months ago. Her decks will also be raised about 2 ft., as was done with the Tampa of the same line last year.

The first serious difficulties on account of low water at the Lime Kiln crossing occurred last week when the wind caused it to fall over a foot. Several boats struck while navigating the crossing but the only accident of moment was that of the steamer Empire City of the Steel Corporation drawing 18 ft. 9 in., which struck directly in the channel between the two lightships. After getting out to the river the Empire City grounded on Upper Point Shoals with one compartment full of water and two others leaking. She was later released by the whaleback steamers Colgate and Bartlett.

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DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED OR ASSOCIATED WITH MARINE MATTERS ON THE FACE OF THE EARTH.

Published every Thursday by

The Penton Publishing Company,

CLEVELAND, OHIO.

CLEVELAND: WADE BUILDING.
CHICAGO: MONADNOCK BUILDING.
DETROIT: HAMMOND BUILDING.
NEW YORK: 150 NASSAU STREET.

Correspondence on Marine Engineering, Ship Building and Shipping Subjects Solicited.

Subscription, $3.00 per annum. To Foreign Countries, $4.50. Subscribers can have addresses changed at will.

The Cleveland News Co. will supply the trade with the MARINE REVIEW through the regular channels of the American News Co.

Entered at the Post Office at Cleveland, Ohio, as Second Class Matter.

OCT. 6, 1904.

Three months ago the Marine Review published an editorial under the caption "Now is the Time to Build Ships." A month later it published a second merely to give emphasis to the first, for the time was ripe then, right at that critical moment, for the man who gave an order for a ship to profit by his action. Ton for ton the ship builders were willing to take orders for ships at a lower price than had prevailed for years, carrying capacity considered, and with such a ship at such a price, ready to go into commission at the opening of navigation next year with the big volume of freight that must assuredly be moved, it meant a profitable investment for the vessel owner. In such a combination the first one in gets the largest odds.

Since that editorial was published orders have been given for ten ships of great capacity. Two of these orders are as yet unannounced as far as owners are concerned, Mr. R. C. Wetmore, vice president of the American Ship Building Co., telegraphing the information from New York yesterday. The advice is repeated that whoever wants to build a ship had better build it now. The 9,000 and 10,000-ton freighter has come to stay. It is the bulk carrier of the future. There is not a surplus of berths on the great lakes where such a ship may be built. An 800-ft. berth, considered ample for two modern freighters, even as late as two years ago, will only build one of these latter-day carriers. It is doubtful if more than fifteen of these great vessels could be built at one time in the yards of the great lakes; and ten of them have already been ordered and several more are in prospect. Therefore if any one wants a really modern carrier by the opening of navigation he would better order now. The available berths are rapidly being filled and, moreover, prices are stiffening. Any delay at this time on the part of a prospective buyer will mean that his rivals have bought more cheaply.

In point of fact anyone who gave an order for a ship three months ago would probably find it difficult to place an order for its duplicate now at the same figure.

There is no doubt that the ship yards of the great lakes will have all they can possibly do this winter; and as far as anyone may foresee the future the vessels of the great lakes will move an enormous quantity of freight next year.

It will be observed that the present issue of the Marine Review is devoted to a discussion of the Panama canal. An effort has been made to treat it from all standpoints, but primarily from the constructive and commercial points. It will be noted, however, that there is very little of a definite character to be said at this moment upon the constructive side for the very vital consideration that the summit level of the canal has not been determined upon. It may yet be a so-called sea-level canal though the accurate settlement of this point cannot be decided until the surveys are completed. Engineers are busily engaged in six sections under the general supervision of Chief Engineer Wallace and their surveys will not be completed for a year hence. The only work under way as far as the actual construction of the canal is concerned is on the Culebra cut. This great cut must be a definite part of the canal system no matter what plan is eventually adopted so that any labor which may now be expended upon it cannot possibly be lost.

Attention is called to a very impressive statement in this issue made by Mr. Carl Ewald Grunsky, one of the commissioners, with the knowledge and approval of Rear Admiral Walker. This statement very briefly and very clearly sets forth present conditions. It, moreover, removes an erroneous impression that the Isthmus is an unhealthful place to work. It may have been at one time extremely so, but modern methods of sanitation have reclaimed it. The Isthmus is practically free from fever of all sorts now and the temperature is not excessive. In fact, the actual figures prove that it is but little more severe than the temperature which rules in the northern states during the heat of summer with the added advantage in favor of the Isthmus that sunstrokes are unknown there.

The commission has wisely made sanitation its first concern. The cities of Panama and Colon are now being provided with a complete system of sewerage and an adequate supply of pure water. The most com-

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mon source of infection is an impure water supply and with a pure supply guaranteed to these cities and to the workmen on the Isthmus it can reasonably be expected that diseases, common to the tropics, will be reduced to a minimum.

It is quitt clear also that no difficulty whatever will be experienced in obtaining sufficient labor to dig the canal. While it is likely that the great part of this labor will be performed by English-speaking negroes from Jamaica owing to the fact that they are good workmen and are inured to manual labor in the tropics there exists no real reason why labor may not be secured from the United States. With a proper observance of the ordinary laws of health the ordinary laborer upon outdoor work in the United States could with equal security be employed upon the Panama canal.

Estimates vary as to the time when the canal will be completed, but it is safe to say that it will not be a navigable body for ten years hence. Nor is it pretended that for a generation or more after it is completed will it be an artery of commerce to compare with Suez or Sault Ste. Marie. The traffic does not at present exist that will make it so. It does not afford for Britain any shorter route to the greater part of the Orient and for that reason will, of course, not be preferred to Suez. In a commercial sense it is chiefly valuable to the United States among the nations, but even to the United States for the present at least its stratagetical importance overshadows its commercial advantages. Not for many, many years to come will it be able to pay the interest charges on the investment and therefore in a broader way it is to be regarded as the magnificent contribution of the United States to the common facility of the whole globe. It is probably also the last great geographical change that mankind will make in the structure of the earth.

The Marine Review has dwelt much upon the fact that nearly 100 years ago our shipping in the foreign trade was 100,000 tons greater than in 1903, that while 90 per cent of our foreign commerce was carried in American ships 100 years ago, but 9 per cent is so carried today, facts, we are glad to note, that Hon. Alton B. Parker, the Democratic candidate for the presidency, makes very effective use of in his formal letter accepting the nomination of his party. We print elsewhere a resume of Democratic pronouncements this year on the shipping question, cleverly grouped together by Mr. Fields S. Pendleton, "a Democrat and a ship owner," who calls our attention to the fact that the Democratic party has abandoned the advocacy of free ships and is now advocating a protective policy, the old Democratic policy of discriminating duties, for the upbuilding of our shipping in the foreign trade, under which our shipping achieved its former great growth. There are some facts and figures, some statements and some inferences in the Democratic output worthy the attention of all Americans, most of all of those Republicans who have, for over forty years, contented themselves with "promising" to upbuild our shipping in the foreign trade. Certain it is that the Democratic record of achievements in the building up of American shipping, when compared with the uninterrupted decline of our merchant marine under Republican administrations, gives force to Judge Parker's suggestion that "the record of the Democratic party gives assurance that the task can be more wisely intrusted to it." Republicans must realize that the time for promises has now gone by, and that performances are immediately in order.

CHICAGO GRAIN REPORT

Chicago, Oct. 4.—Chartering in this quarter has been with good regularity since last report on basis of 1¼ cent corn for Buffalo and Georgian bay and 3½ cent Montreal corn— the nominal basis in Kingston, etc., at 2½ cents per bushel and to Ogdensburg at 3 cents per bushel.

Although weekly figures note a comparative falling off in receipts and out-movement the shipping inquiry has been sufficient fully to meet current vessel demands. There is considerable wheat directed for Chicago delivery to come from Duluth, this amount estimated at some 5,000,000 to 6,000,000 bu., and in addition to which considerable quantity is due from the Pacific coast, viz., Oregon, etc., the recent purchases of which estimated in neighborhood of 12,000,000 bu. The immediate receipts of past week included some 810,000 wheat, 1,600,000 corn, 1,500,000 oats and 1,400,000 barley.

Lake and rail interests report suitable conditions in package freight movement and the immediate outlook indicates that their steamers will be practically out of grain handling for the balance of season.

Of the total weekly shipments, summarized below, distribution is noted about as follows: Via all rail lines of wheat 240,000 bu., corn 227,000 bu. and oats 481,000 bu.; via lake routing to Buffalo of wheat 340,000 bu., corn 1,500,000 bu., and oats 150,000 bu.; and via lake for Canada points of wheat 40,000 bu., corn 680,000 bu. and oats 170,000 bu.

Lake and Rail Shipments.

	This week.	Last week.	Same week last year.
Wheat	576,116	440,929	747,840
Corn	2,311,560	3,313,734	3,664,655
Oats	774,251	776,266	994,969
	3,661,927	4,530,929	5,405,464

	Shipments since Jan. 1, 1904.	Same time last year.
Wheat	11,506,927	15,624,709
Corn	57,746,830	67,830,982
Oats	34,554,143	50,000,548
	103,807,900	133,465,239

Stocks of Grain in Elevators:

	This week.	Last week.	Same week last year.
Wheat	4,779,000	4,730,000	6,840,000
Corn	4,824,000	5,552,000	6,862,000
Oats	10,616,000	10,177,000	2,844,000
Rye	744,000	540,000	586,000
	20,963,000	21,014,000	17,132,000

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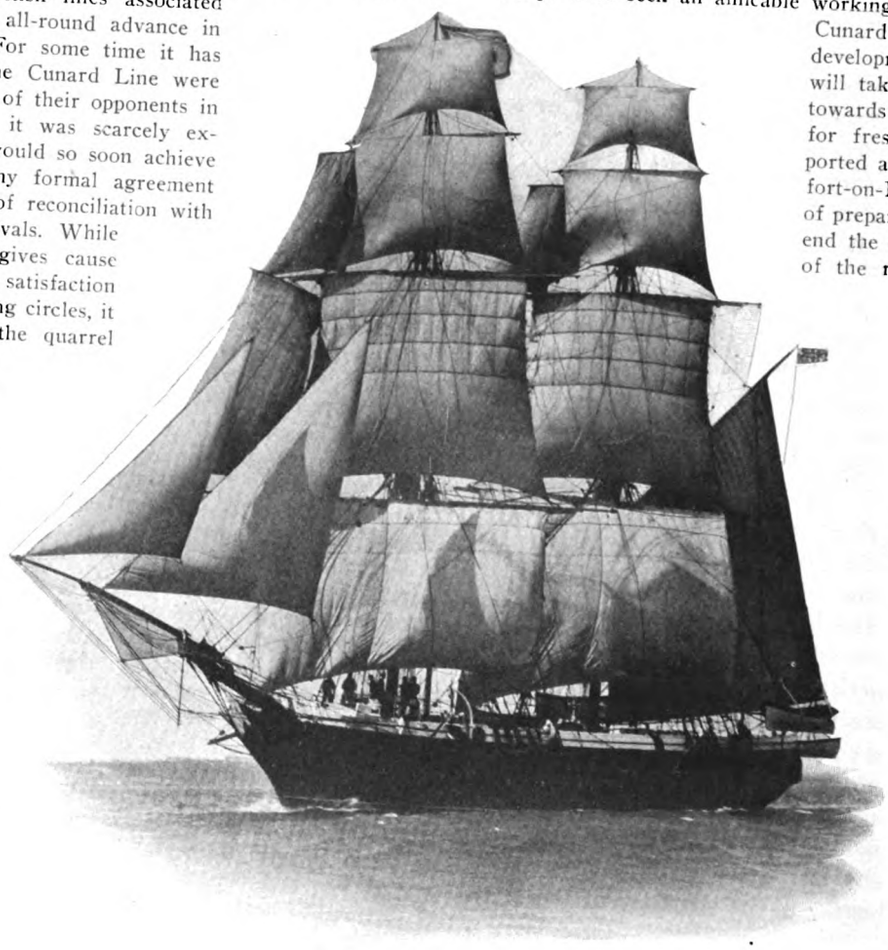
LIVERPOOL SHIPPING LETTER

Liverpool, Sept. 26.—The North Atlantic rate war may be now said to have collapsed in the complete defeat of the German lines. The struggle which was initiated by the continental steamship companies in May last with the express object of so crippling the Cunard company that they would be glad to relinquish their monopoly contract for the Austro-Hungarian emigrant traffic, has without any sensational incident ended by the German lines increasing their westward steerage rates by five dollars and this example has been followed by the British lines associated with them in an all-round advance in steerage fares. For some time it has been seen that the Cunard Line were getting the better of their opponents in the struggle, but it was scarcely expected that they would so soon achieve victory without any formal agreement or announcement of reconciliation with their continental rivals. While this happy issue gives cause for expressions of satisfaction in Liverpool shipping circles, it is regretted that the quarrel between the Hamburg-American and Cunard lines should have inflicted such loss on the lines associated with them, and other shipping companies which had most unwillingly been forced into the war to safeguard their passenger traffic. However it is believed that the transatlantic passenger rates will be gradually increased but some time will elapse before they reach the higher level which existed before the rate war began. In this connection it should be noted that the Cunard company have so far made no advance in their rates, but then they have never been so low as the German and associated lines, although they have commanded sufficient passenger traffic to fill to overflowing every one of their outgoing vessels. As one proof of this assertion it may be stated that recently there were four Cunard liners in New York harbor at the same time, namely the Campania, Umbria, Carpathia, and Slavonia, and they had landed no fewer than 4,786 passengers, 1,740 of whom traveled cabin and 3,046 third class. Doubtless the Cunard company will put up their westward rates in due time, but at the time of writing they are careful to withhold what their intentions are as to the future.

But whilst the Germans have beaten a retreat in regard to the North Atlantic, the Hamburg-American company is said to be determined upon trying to wrest from the Cunard company the Austro-Hungary traffic by making considerable reductions on the steerage rates in that trade. An authority on the subject has, however, expressed the opinion that the continental lines have less chance of succeeding in their object by these means than they had in the North Atlantic rate war. In fact to put it more explicitly, whilst the Germans had a hope of success in the North Atlantic, they have not the slightest chance of driving the Cunard from the Adriatic, for the simple reason that no German vessel under the Cunard agreement with the Hungarian government will be allowed to embark passengers at Trieste, Fiume or other Hungarian ports. There is therefore little prospect of Herr Ballin succeeding in this quarter, and some incline to the opinion that the only rational course that the Germans can adopt is to seek an amicable working arrangement with the Cunard company. Important developments are expected will take place in a few days towards a pacific settlement, for fresh conferences are reported as being held at Frankfort-on-Maine with the object of preparing fresh proposals to end the dispute. The collapse of the rate war has resulted in the Canadian lines canceling the circular I noted last week, announcing a further reduction in the westward rates beginning with Oct. 1 of from $15 to $10, and it is also reported from Berlin that the German companies have also resolved to abandon the Scandinavian service, which was called into being for the purpose of depriving the Cunard company of its monopoly of the direct Scandinavian traffic. The Germans it is said will, however, continue to offer unusually low terms to Scandinavians who travel to America via Hamburg or Bremen.



HOMEWARD BOUND.

The White Star leviathan liner Baltic which left this port for New York on Wednesday will now have the record not only of being the largest ship afloat, but of carrying the largest number of passengers on a single trip, she having on board over 3,000 passengers in addition to a crew of 350 hands. Reference to the Baltic reminds me that Messrs. Harland & Wolff at Belfast are building a sister ship to the Baltic for the Hamburg-American Line. This new vessel which will be named the Adriatic will be half a knot faster than the Baltic, giving her 17½ knots speed with 15,000 H. P. compared with 14,000 in the White Star vessel. She is expected to be ready for her maiden voyage next spring.

It is reported here that the Allan liners Austrian and Phoenician, which have been engaged for many years in the service from Glasgow to Quebec, Glasgow to Boston, and Liverpool to River Plate have been sold to continental buyers. and their places will be taken in the services by faster and more modern vessels. The Austrian is an iron screw steamer of 2,704 tons gross and 1,638 tons net register, and was built in 1867 by Messrs. Barclay, Curle & Co. of Glasgow.

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The Phoenician is also an iron screw steamer of 2,425 tons gross and 1,532 tons net register built in 1864 by the same firm. With the departure of these vessels the oldest vessels left in the Allan fleet the Peruvian built in 1863, the Sarmatian built in 1871 and the Sardinian 1875. Of the vessels building for the Allan Line, two are the turbine steamers Victorian and Virginian.

Yet another steamship service is to be inaugurated in connection with the Manchester ship canal trade. This service will be put on with a view of increasing the traffic between the canal and Australian and New Zealand ports. The Federal Line has had sailings from Manchester for Australian ports though these have not up to the present been regular. Now the steamer Suffolk, which has previously sailed between London and Australia is to be placed on the service between Manchester and Australia. She is a twin-screw steamer of 10,000 tons, and has undergone considerable alteration in order to fit her for the canal trade. She will sail early in October for Adelaide, Melbourne, Sydney, Auckland, Wellington, Lyttleton and Port Chalmers. It is expected that this sailing will be followed by others, and should the trade warrant it, a regular shorter service may be established.

Apropos the Manchester ship canal, the Manchester Liners, Ltd., just announce a heavy debit balance. The directors say in explanation of how this has arisen, that the past year, and especially the second half, has been one of continued depression. The unremunerative condition of freights reported last year has continued, particularly in the Canadian and North Atlantic trades, in which the majority of the company's vessels have been regularly employed. The loss for the past year has been $7,700 which added to debenture interest and other charges make the debit balance $79,775. Altogether with dividends in arrear on the preference shares there is a deficit of $104,060 for the year. A year ago the Manchester Liners, Ltd., earned sufficient to pay 2½ per cent dividend to ordinary shareholders, and in the two previous years 5 and 10 per cent respectively.

The managing director of the British Dredging Co., which has been offered the contract for removing 32 million yards of mud and sand from New York harbor has given to a press representative here the following particulars: "Owing to the fact that shipping has outgrown the capacities of the Main Ship and Sidney channels of New York harbor—as was illustrated quite recently by the fact that the White Star liner Baltic was forced to leave behind some 4,500 tons of cargo, which she would otherwise have carried had there been sufficient depth of water to carry her seaward—the hopes of the Americans have turned to the Ambrose or East channel which is a straight cut from the narrows to the sea. This channel when completed will have a width of 2,000 ft, and a depth from 40 ft., which will not only afford a sufficiently deep and commodious waterway, but will obviate the perils incident to the sharp turns and dangerous elbows of the existing channels. This company, which has the option of the contract for three months from Sept. 15, are proprietors of the Fruhling system of dredging which not only leaves the bottom level, but has been proved capable of raising material like that to be met with in the Ambrose channel at a very much greater rate and lower cost than any other system of dredging in existence. The dredging operation carried out in the Ambrose channel under authorization of the United States congress has so far been unsatisfactory from the fact that since 1899 only 10,000,000 yards of material have been removed to date by ordinary suction dredges, and their work has been further unsatisfactory by reason of the holes and ridges or uneven bottom left which is dangerous to navigation. With regard to the price at which the contract has been offered, the managing director further says: "I do not see any reason for concealing this price which is 10 cents per yard, and taking into consideration that we can work night and day, and that we have only to take the material about six to seven miles to sea. I consider the price a very fair one, even for contractors using the ordinary system of dredging. In the event of the firm deciding to accept the contract, they will probably put on two or three powerful Fruhling system dredges capable of removing from 10 to 15,000,000 tons per annum, as against a minimum of 4,000,000 tons stipulated by the United States government.

ITEMS OF GENERAL INTEREST

The Eastern Steamship Co. declares a semi-annual dividend of 3 per cent payable Oct. 1.

The four-masted schooner Ellen Little was launched last week from the yard of Carr, Butler & Co., Rockland, Me. The little is 188 ft. long, 39 ft. beam and 11 ft. deep.

Messrs. James & Tarr of Essex, Mass., are constructing a seining schooner of about 143 tons for Capt. Wallace Parsons. She is to be used for the frozen herring industry of Newfoundland.

The four-masted schooner Ellen Little was launched last week from the yard of Carr, Butler & Co., Rockland, Me. Her dimensions are: keel, 188 ft.; beam, 39 ft. 2 in.; depth of hold, 11 ft. 7 in.

The Marine Central Railroad Co. will build a new steel steamer for the Frenchman's Bay service, to take the place of the steamer Sebenoa on the route between Mt. Desert ferry and Southwest harbor.

The canal bureau has passed upon plans for the construction of certain portions of the enlarged Erie canal aggregating about $7,000,000 and as soon as the specifications are printed the work will be advertised for by Hon. Charles C. Boyd, superintendent of public works, Albany.

The paper upon "Modern Expanding and Flanging Machinery and Tools" by Luther D. Lovekin, chief engineer of the New York Ship Building Co., Camden, N. J., has been reprinted from the Journal of the Franklin Institute and is now to be had in pamphlet form. It is an exceedingly valuable pamphlet.

The Jeebi, the 21-footer owned by Arthur D. R. Brown, Flushing, N. Y., and designed by Thomas Clapham, Roslyn, Long Island, N. Y., has won two more races in the 21-ft. open jib and mainsail class since the career of this remarkable little craft was published in the issue of the Marine Review of Aug. 11. This makes twelve races straight for the Jeebi this season.

The government patrol boat Cerberus was launched from the yard of John H. Dialogue & Son, Camden, N. J., last week and was named by Miss Norma Morrison, daughter of John G. Morrison, 504 Jefferson ave., Brooklyn, N. Y. The Cerberus is 100 ft. long and is built of steel. She is intended for patrol service in New York harbor. Her special purpose is to prevent illegal dumping in the channel or harbor approaches.

It is proposed to build one of the steam colliers authorized by the last congress at the New York navy yard. The collier will probably occupy the ways just vacated by the battleship Connecticut. Two colliers were authorized by the last congress to be of sufficient size, speed and power to accompany a battle fleet. They are to have a cargo carrying capacity of 5,000 tons and a speed of 16 knots. The sum of $1,250,000 was appropriated for each collier.

October will be a month of launchings of war ships. The battleship Nebraska is to be launched at the yard of Moran Bros. Co., Seattle, Wash., on Oct. 7, the battleship Georgia at the Bath Iron Works, Bath, Me., on Oct. 11, the training ship Boxer at the Portsmouth navy yard on Oct. 7, the gunboat Paducah at the yard of the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, New York, on Oct. 11, and the training ship Intrepid at the Mare Island navy yard during the latter part of the month.

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MR. WALLACE PRESIDENT; MR. LOGAN MANAGER

At the annual meeting of the American Ship Building Co. held at Jersey City yesterday, Mr. James C. Wallace was elected president and Mr. Robert Logan general manager of the company. Mr. Wallace was formerly the vice president and general manager and Mr. Logan was the assistant general manager. These promotions come to men who have deserved them. The career of Mr. J. C. Wallace has been most extraordinary since he has reached the presidency of one of the most solid industrial enterprises of the country at the age of thirty-nine years. Mr. W. L. Brown, the retiring president, continues as chairman of the board of directors. Mr. Russell C. Wetmore, formerly secretary and treasurer, has been appointed vice president and treasurer. Mr. Ora J. Fish becomes the secretary and assistant treasurer. Mr. James H. Hoyt retains his position as general counsel. The only change noted in the board of directors is that Mr. R. C. Wetmore takes the place of Mr. L. C. Hanna, who retires on account of ill health. The only change in the executive committee is that Mr. Wetmore takes the place of Mr. A. B. Wolvin.

The fifth annual report of the company shows its financial position to be of the soundest. Its undivided profits as of June 30, 1904, are $3,678,442.75. A significant statement in the annual report is that the company has now nine steamers under contract for fall and winter work with fair prospects of several more. It follows, therefore, that orders for two more steamers have been closed within the past day or two because only seven contracts have been definitely announced. For whom these two new steamers are building is not as yet known, but they are undoubtedly of the largest and most modern kind. The company built during its fiscal year ended June last, thirty-six steamers with a carrying capacity of 206,000 net tons based on 18 ft. draught.

In September last the company cancelled its mortgage of $150,000 upon the Buffalo plant so that the company has now no encumbrances whatever.

The board of directors as at present constituted is as follows: William L. Brown and H. H. Porter, jr., of Chicago; Robert Wallace, H. M. Hanna, Robert L. Ireland, James C. Wallace, Russel C. Wetmore, Luther Allen, Frank W. Hart of Cleveland; Alexander McVettie and W. C. McMillan of Detroit; J. A. McGean, Montclair, N. J.; L. M. Bowers, Binghamton, N. Y.; A. B. Wolvin, Duluth; Andrew M. Joys, Milwaukee.

The new executive committee is: Luther Allen, R. C. Wetmore, R. L. Ireland, W. L. Brown, L. M. Bowers, A. McVettie and J. C. Wallace.

The annual report of the retiring president, Mr. William L. Brown, was very lucid and was as follows:

"During its fiscal year the company has not done very much in obtaining new construction, its principal work in that direction being the completion of what was under way at the commencement of its year. Notwithstanding, however, the lack of business in that direction, it will be noted by its financial statement that it has done a fairly profitable business, and with the economies that it can apply in quiet times, it is believed by its management that it can continue to show good earning power.

CAPITAL STOCK.

Remains unchanged from last year, viz.:

AUTHORIZED.

Preferred	$15,000,000
Common	15,000,000
Total	$30,000,000

ISSUED.

Preferred	$ 7,900,000
Common	7,600,000
Total	$15,500,000

DIVIDENDS.

"Regular quarterly dividends of 1¾ per cent. have been paid on the preferred stock; and one quarterly dividend (Sept. 1, 1903) of 1 per cent. on the common stock.

PROPERTY OWNED AND CONTROLLED.

Cleveland, Ohio.—Construction Yard, Machine Shops, Boiler Shops, three Dry Docks, Foundry.

Lorain, Ohio.—Construction Yard, Machine Shop, one Dry Dock.

Detroit, Mich.—Machine Shops, Boiler Shops, Brass Works, three Dry Docks, Foundry.

Wyandotte, Mich.—Construction Yard, Machine Shops.

Superior, Wis.—Construction Yard, Machine Shop, two Dry Docks.

Chicago, Ill.—Construction Yard, Machine Shop, one Dry Dock.

Milwaukee, Wis.—Machine Shops, two Dry Docks.

Buffalo, N. Y.—Construction Yard, Machine Shop, four Dry Docks.

West Bay City, Mich.—Construction Yard, Machine Shop.

CONDITION OF PROPERTY.

"Considerable improvements and additions under way at the end of its last fiscal year were early completed, and the efficiency and equipment of all its plants, for building, repair work and dry dock purposes is at the highest standard necessary for its business. The sum of $200,000 has been kept intact for further improvements when necessary. In September of this year, the purchase mortgage on the Buffalo property ($150,000) matured, and has been paid, so that the company has no encumbrances.

Work done is as follows:

	Vessels built.	Carrying capacity, net tons
Superior	6	36,100
Buffalo	2	7,800
Lorain	8	52,500
Cleveland	6	38,000
Detroit	5	25,000
Chicago	6	25,600
Bay City	3	21,000

TOTAL.

Vessels built	36
Carrying capacity, net tons	206,000

(Carrying capacity is based on draught of 18 ft.)

SUMMARY AND PROSPECTS.

"While it is difficult and always uncertain to attempt to forecast the possibilities of new construction, we know that the volume of freight and passengers carried on our lakes shows a gradual increase, which will certainly grow, that much of the tonnage is getting old and out of date, that it is being rapidly demonstrated that the modern and larger ship is much more economical to operate than the old, and that all these conditions foreshadow a fair average of new construction each year. We have now nine steamers under contract for fall and winter work, with fair prospects of several more.

"As announced to the executive committee, I have concluded to retire from the active management incident to the office of president, and with your approval, assume that of chairman of the board, it being my intention to give to the company, in an advisory capacity, such time and attention as may be necessary, and I bespeak for my successor as president the same cordial support from its officers and associates, as has in the past added so much to its success. The condensed balance sheet herewith shows the condition of the company."

Mr. R. C. Wetmore, treasurer, submitted the condensed balance sheet as follows:

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RESOURCES.

Plants and property		$15,418,560 63
Additions and improvements for year		35,011 14
Material on hand (market value)		523,734 68
Accounts and bills receivable		2,633,935 63
Due us on construction contracts		1,188,606 65
Cash		779,051 99
		$20,578,900 72

LIABILITIES.

Capital stock, preferred			$7,900,000 00
Capital stock, common			7,600,000 00
Accounts and bills payable			966,833 07
Reserve for maintenance			200,000 00
Reserve for Buffalo mortgage			150,000 00
Reserve for fire insurance			83,624 90
Earnings		$1,028,174 74	
Less dividends on preferred	$ 553,000 00		
Less depreciation and maintenance	209,717 86		
Less rebuilding dry docks and other repairs	78,329 56	841,047 42	
Undivided profits for year ending June 30, 1904		$ 187,127 32	
Surplus fund, June 30, 1903	$3,567,315 43		
Less dividend on common	76,000 00	3,491,315 43	
Undivided profits, June 30, 1904			3,678,442 75
			$20,578,900 72

FREIGHT SITUATION

If it is not one thing it is another that serves to keep the freight rate at its present level. Under ordinary circumstances with the rate of 2 cents on grain ruling from Duluth the ore rate should be 75 cents or better. But the rate holds at 70 cents notwithstanding the fact that the movement of ore is about as heavy as it ever was on the great lakes. The principal thing which has operated to keep the rate at its present level is undoubtedly the unusual despatch which ore vessels are receiving at Lake Erie docks. Even the largest carrier is compelled to lay not more than two days unloading its cargo of ore. This is, on its face, surprising with the movement of ore proportionately as great as during the past two years when the docks were fearfully congested. The explanation lies in the fact that the general volume of business is not as great, and therefore, the railways have more time to devote to the ore trade. Moreover they have added greatly to their rolling stock during the past two years and can easily take care of a greater volume of business.

It has been known that ore sales have been somewhat brisker during the past few weeks, and this too has had a tendency to stimulate the movement of ore. Altogether it is now expected that the total aggregate of shipments during the year will be nearer 18,000,000 than 17,000,000 tons. Offerings of cargoes in the iron ore trade have been quite liberal during the past two weeks but as a rule vessel owners have first tried to place their vessels for grain before accepting ore. This is evidenced by the fact that owners would frequently not place their vessels until after they had reached the head of the lakes and the chances of obtaining grain had been pretty thoroughly exploited.

The coal trade continues demoralized. This commodity is moving only in small quantities and the monthly receipts at the head of the lakes show a considerable falling off over the shipments for the corresponding period last year.

Indeed the flatness of the market with little probability of advancing rates, save perhaps 5 cents on ore, doesn't lend a very pleasing aspect from the vessel owners' standpoint to the effect that wages were generally advanced on Oct. 1. The advance is in accordance with an agreement made with labor at the opening of navigation last spring. The wages of wheelsmen, watchmen and lookouts are increased from $45 to $65 per month; ordinary seamen from $25 to $37.50 per month; able bodied seamen from $45 to $65 per month; second cooks from $30 to $37.50 per month; porters from $25 to $30 per month, except on package freighters where they receive the same pay as second cooks; and firemen, oilers and watertenders from $45 to $65 per month.

When the vessels of the Steel Corporation come out next spring it will be found that they will be all of uniform color. The corporation has decided to paint all its vessels after the style of the old Minnesota, which was an iron ore color. The aluminum smoke stack with black top, and white deck houses will be retained.

ORDERS FOR MORE SHIPS

During the past week the American Ship Building Co. closed contracts for two more giant freighters. One of the vessels is for H. S. Wilkinson and L. C. Smith of Syracuse, N. Y., who are the leading men in the United States Transportation Co. which has a fleet of modern steamers at present on the lakes. The new steamer will be a duplicate of the vessel recently ordered by Mr. Samuel Mather of Cleveland. She will be 545 ft. over all; 525 ft. keel, 55 ft. beam and 31 ft. deep. Her carrying capacity will be 10,000 tons. She will have thirty-three hatches and her construction will be of the arch type. The sides of her hopper bottom, however, will be straight instead of sloping as in the case of the Wolvin. Her engines will be of triple-expansion, with cylinders 23½, 37½, 63 in. diameters. Steam will be supplied by two Scotch boilers 14½ ft. in diameter and 11½ ft. long, to be fitted with Ellis & Eaves draft. She will be built at the Wyandotte yards.

The contract for the second steamer was closed by the Buffalo & Susquehanna Steamship Co., of which F. H. Goodyear and S. H. Clement of Buffalo, and Capt. John Mitchell of Cleveland are the principal stockholders. This vessel will be a duplicate of the steamer now building at Lorain for G. A. Tomlinson of Duluth. Her dimensions are: 500 ft. over all; 400 ft. keel, 52 ft. beam and 30 ft. deep. She will also be constructed on the arch system and have twenty-eight hatches. Her engines will be triple-expansion, supplied with steam from two Scotch boilers, and fitted with Ellis & Eaves draft. Her carrying capacity will be 9,000 tons.

Telegraphic advices from the annual meeting of the American Ship Building Co. at New York are to the effect that two more orders have just been received by the company for freighters but for whom has not yet been announced.

Changes have been made in the plans of the new Tomlinson steamer which is to be built in the yards of the Great Lakes Engineering Works, Detroit. She is to be 24 ft. longer and 2 ft. wider than was originally intended which will make her 524 ft. over all, 504 ft. keel and 54 ft. beam. The purpose of these changes is to increase the carrying capacity which it is now expected will enable her to carry 10,000 tons of ore.

Capt. Frederic L. Chalcraft, a well-known navigator of Buffalo died last week after an illness of several months.

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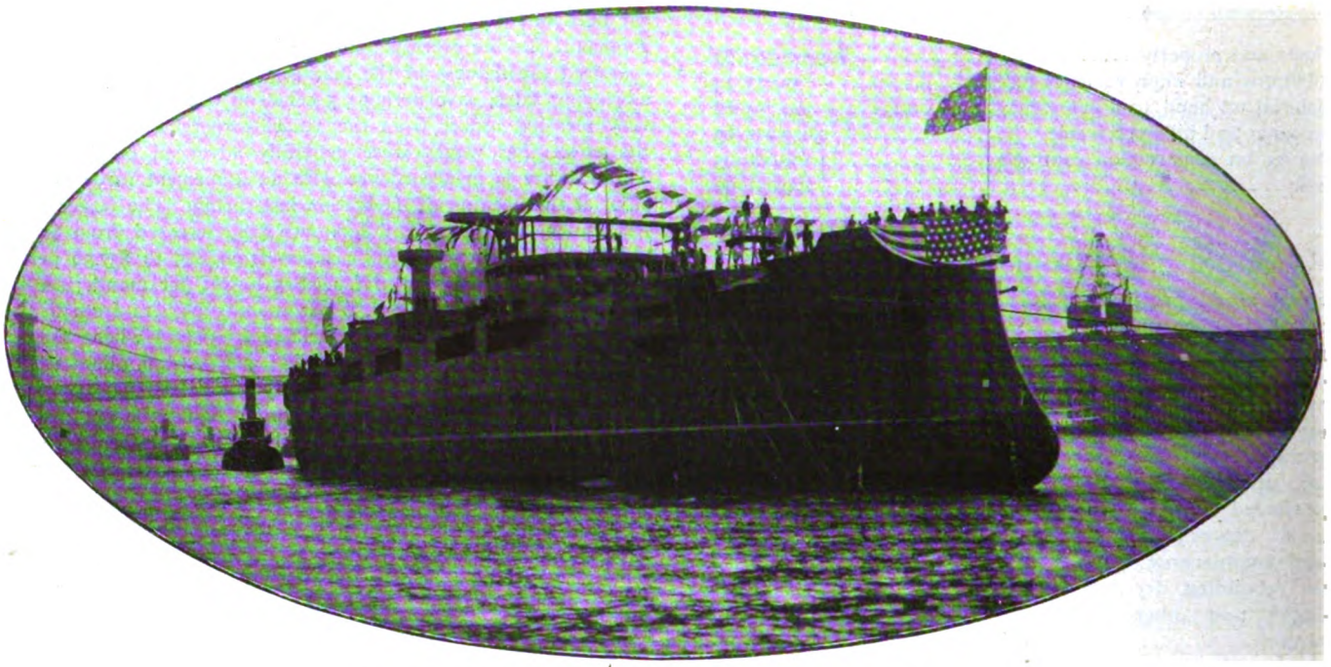


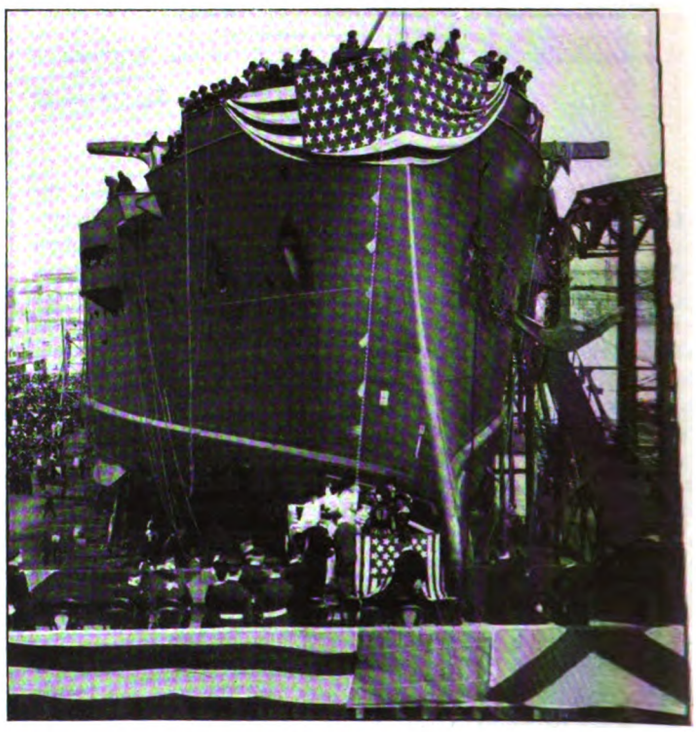
THE BATTLESHIP CONNECTICUT JUST AFTER THE LAUNCH.

LAUNCH OF THE CONNECTICUT

The battleship Connecticut was successfully launched at the Brooklyn navy yard last week despite dastardly attempts which were made to prevent such a successful issue. It seems incredible that such work should be attempted because there could be no possible motive save malice. Yet the evidence is clear that an effort was made either to prevent the launching of the ship or to have her severely injure herself while sliding down the ways. The statement from the navy department detailing these attempts will be found in the latter part of the present article.

The launch, however, was eminently successful and was carried out without a hitch. As early as eight o'clock vast crowds began to stream into the navy yard, special details of marines and yard policemen being stationed near every entrance and along the roadways leading to the launching ways.

JUST AFTER SHE STRUCK THE WATER



THE LAUNCHING PARTY.

Dressed rainbow like the Connecticut, red lead hued from keel to gunwale and sections of main bridge and stump aft turrets alone showing above her hull, presented an imposing appearance as she lay stern on towards the river, resting on the ways.

Among the first of the guests to arrive was Miss Alice Welles who is the grand-daughter of Gideon Welles, secretary of the navy in the cabinet of President Lincoln. With her was Rear-Admiral Rodgers who carried an armful of

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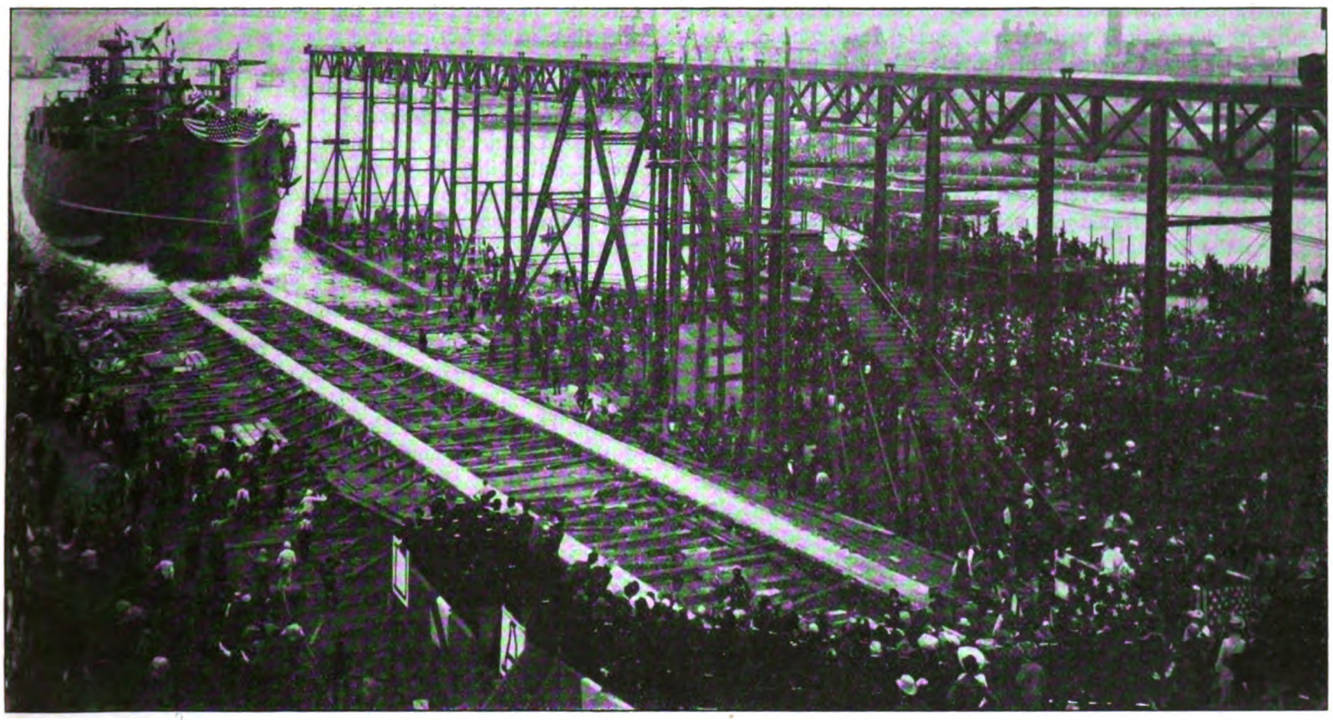

JUST AS SHE STRUCK THE WATER.

American beauties. Behind them were Governor Chamberlain of Connecticut and Mrs. Chamberlain.

The launching stand now began to fill rapidly, the arrivals including Mrs. Rodgers, wife of the commandant of the yard; Secretary Morton, Rear Admirals Coghlan, Melville, Barker, Sands and Chester, Chief Naval Constructor Capps, Rear Admiral Rivet of the French man-of-war Duplex, with the captain of the Troude; Maj. Gen. Corbin, Brig. Gen. Grant, Maj. Gen. Heywood, Commander Coombs, Commodore F. G. Bourne of the New York Yacht Club, Col. John W. Vrooman and Police Commissioner McAdoo. The Navy League of the United States was also well represented.

The only mishap whatever was the failure of Miss Welles to break the bottle. The movement of the ship was so rapid that it took Miss Welles entirely by surprise and she was unable to break the bottle or to pronounce the christening words. Rear Admiral Rodgers realized the mishap and endeavored to clutch the bottle as it passed but missed it by a few inches. A sun-browned workman aboard the ship saved the day, however, by leaning over the bow and grasping the bottle lanyard hauled in hand over hand. He spoke the words and swung the bottle down but it failed to break. The Connecticut was now within a few feet of the water when the workman shortened the line and with a violent blow brought the bottle against the vessel's sides, smashing it to pieces. He also christened her as she took the water. After the launching Secretary Morton with his party attended an informal luncheon at the officers' pavilion, Rear Admiral Rodgers and Barker making brief speeches.

The Connecticut is a sister ship of the Louisiana, both vessels being authorized in 1902.

The Connecticut is of steel, with a trial displacement of 16,000 tons and a maximum displacement of 17,770 tons. The vessel is 450 ft. on the load water line, 456.4 ft. over all, 76.10 ft. beam and 24.6 ft. draught. The engines will be of the twin-screw, vertical, four-cylinder triple-expansion type, with a combined horse power of 16,500, and these will accumulate a speed of eighteen knots. The Connecticut will carry three funnels, two military masts, two main and four secondary turrets and a main deck central battery. The armor has a total weight of 3,992 tons. On each side amidships there is a steel belt 193 ft. long, 9 ft. 3 in. wide and 11 in. thick. Forward and aft of this belt is another, 9 in. thick, covering the magazines. This is ended by 6-in. bulkheads. On the lower deck for 284 ft. the armor is 6 in. thick, and on the main deck for 236 ft., where the central battery is, the armor is 7 in. thick. The protected deck is 1½ in. thick on the flat and 2½ in. on the slopes. The main turrets are 8 in. thick, with 12½-in. faces. There are two of these. The barbettes are covered with 10 in. of armor, and the secondary turrets with 6 in of armor with 6½-in. faces. The conning tower is protected with steel armor 9 in. thick, and the signal tower with 6 in. of steel.

The Connecticut's armament will consist of four 12-in. breech loading guns and eight 8-in. guns in pairs in four turrets on the superstructure. In the main deck battery there will be twelve 7-in. rapid fire guns. In addition there will be twelve 14-pounders, twelve 3-pounders, six 1-pound automatic guns, two 1-pound semi-automatic and eight 30-inch machine guns. In the magazines she will carry 60 rounds for each 12-inch gun, 100 rounds for each 8-inch gun and 7-inch gun, 500 rounds for each 3-inch gun, 600 rounds for each 3-pounder and 960 rounds for each 1-pounder.

The coal bunker capacity of the Connecticut is 900 tons normally, but in an emergency this can be increased to 2,200 tons. Ordinarily she will carry sufficient coal to steam 7,000 miles at 11 knots, or 2,500 miles at 18 knots. The Connecticut is to be fitted for use as a flagship, and when in commission will carry 42 officers and 761 men. She is not to exceed $4,212,000 in cost.

From the following statement issued from the bureau of construction and repair it shows that very skillful attempts were made to wreck this vessel. The attempts could not have been made by others than experts and prove that it must have been done by someone aboard the ship. The Connecticut is now patroled both day and night, both inside and outside, and it is not possible that any further damage can be inflicted upon her. The report of the bureau is as follows:

"The bureau regards any attempt to wreck a vessel of war, whether built or building, as a most serious crime, punishable in the severest manner possible if the culprit should be discovered. In order that the gravity of such an offense and

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the punishment therefore may be fully known and appreciated among all classes, it is realized that special legislation on the subject be enacted which will provide adequate punishment for those who might damage or attempt to damage, maliciously, public property, either completed or in course of preparation and intended for national defense."

"As reported in the naval constructor's letter of April 1, 1904, there were discovered on March 31 in compartment B-87 two rivets in frame 58 1-2, connecting the forward frame angle to the keel plate, whose heads had been chipped off, holes drilled completely through them and the rivets forced down into the keel block beneath by heavy pressure; one being on the port side and driven about one-half inch into the block, and one on the starboard side and driven about one inch into the block. Attention is invited in the naval constructor's report to the fact that excellent workmanship was displayed in drilling through these rivets and excellent judgment was shown in determining the place to destroy them by cutting out these rivets over the keel block where there would have been no leakage from the outside of the ship while the compartment was under test pressure.

"On Sept. 14, while the diver was sweeping the underwater portion of the ways on the Connecticut, there was found a bolt about 1 3-8 in. in diameter, which was located about mid-width of the starboard under waterway and about half way between the intersection of the ways with low water and the end. This bolt was driven into the ways and projected up about six inches, making an obstruction which would have caused serious injury during the launch and might have entirely prevented it. These ways had previously been inspected by the diver at which time no such bolt was found.

"On Wednesday, Sept. 28, the quarterman ship fitter in charge of the Connecticut, the quarterman riveter and the leading man riveter in charge of testing gang, made a thorough and complete inspection of each watertight compartment on the vessel and after these compartments were inspected the manhole cover was closed down and fastened. The result of these inspections was reported and everything was at that time secure and in good condition. After the launch on the twenty-ninth, it was found that compartment B-88 (the port after boiler room reserve feed tank) was making water. The pumps were started and the water was kept under control. It was finally decided to permit the compartment to be entirely full, close all air pipes and drain valves, and let the compartment remain full during the night of the twenty-ninth. This was accordingly done and the compartment was inspected after it was full and the inner bottom and sounding frames and longtitudinals were seen to be absolutely tight, and no damage resulted to the ship.

"On the morning of Sept. 30, the pump was started, the compartment was pumped down and the quarterman riveter went into the compartment when the water was about 5 inches off the bottom and discovered that a ¾-in. hole had been drilled through the outside shell plate between frames Nos. 61 and 62, outboard of the third watertight longitudinal and about 3 in. from the edge of the shell lap. The location chosen for drilling this hole was over the packing on the sliding ways, where it would have been impossible to detect its presence from the outside. The location of the hole for working purposes being absolutely useless, indicates that it was done maliciously. An examination of the compartment and hole by Assistant Naval Constructor Robinson of this department indicates that the hole was drilled from the inside. This hole has been safely plugged and the manhole cover fastened down and can safely remain in this condition until such time as the vessel is put in dock.

"The official records of this department show that compartment B-88 was tested on the 24th of March at a water pressure head of 27 ft. 4½ in. and was absolutely tight. This was done in the presence of an officer of this department. The outside plating in wake of the entire cradle was also carefully inspected before the cradle was built in place and was then in perfect condition.

"In view of these malicious acts, which involved danger to the ship and possible loss of life of the men employed thereon, it is respectfully recommended that the ship be brightly illuminated both day and night; that special watchmen of mechanical ability be employed and that all employes on the ship be informed of these malicious acts, in order that each one of them may feel that it is his duty to guard against their recurrence."

PERSONAL

Rear Admiral Frederic Rodgers retired this week as the commandant of the Brooklyn navy yard and is succeeded by Rear Admiral Joseph B. Coghlan.

John Haug of Philadelphia has extended his professional work as consulting engineer and naval architect to New York and vicinity. His New York address is care of Mather & Co., 51 Wall street.

Spencer Miller, chief engineer of the Lidgerwood Mfg. Co., New York city, has returned from St. Petersburg, Russia, where he went by request of the Russian government to inspect ten Lidgerwood marine cableways which they had installed upon the ten largest battleships and cruisers of the Baltic fleet, known, however, in Russia as the Second Pacific squadron and the sailing of which has been a matter of much discussion in the daily press for three months past.

Mr. Adam Steel of Steel, Nacey & Hynd, marine architects, consulting engineers, surveyors and marine specialties, No. 208-9 Western Reserve building, Cleveland, has severed his connection with the firm and has accepted the position of superintendent with the Buffalo Dry Dock Co., Buffalo, N. Y. The report current last week that Mr. Alexander Hynd also intended to withdraw from the firm was an error, as Mr. Hynd remains in Cleveland and the business will be continued as formerly under the name of Nacey & Hynd.

OBITUARY

Frank W. Ofeldt, the inventor of the naphtha launch, died at his home, 172 Twenty-third street, South Brooklyn, last week. Mr. Ofeldt was seventy years of age.

Capt. James Boyle of Buffalo, one of the best known tugmen, died at his home this week. He had been connected with the towing business for over forty years.

John B. Morrill, the first mate of the steamer E. W. Oglebay, died in the marine hospital at Sault Ste. Marie last week. He was struck with paralysis on a trip up the lakes two weeks ago. His home was in Cleveland.

Robert McLauchlan died at his home in Cleveland on Monday. He was born in Scotland and came to Cleveland in 1854. He was the vice president of the Wilson Transportation Co. and a stockholder and director of a number of banks.

John W. Thomson who died last week at Sierra Medre, Cal., was a pioneer resident of Port Huron notwithstanding the fact that he did not come to the United States until he was forty-one years old. In 1858 he was appointed Port Huron agent of the Ward Line of steamers and held a position until 1869 when he moved to Detroit as general agent of the Lake Superior Transit Co. He lately returned to Port Huron. He was eighty-eight years old at the time of his death.

The excursion steamer Columbia of the Detroit, Belle Isle & Windsor Ferry Co.'s fleet has been taken to the plant of the Great Lakes Engineering Works to receive alterations in which her shade deck will be extended to the stern rail. She will also be equipped with a steam capstan and stockless anchors.

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DEMOCRACY'S ATTITUDE TOWARDS SHIPPING

Below will be found extracts from the national platform of the democratic party upon the subject of the American merchant marine, together with a discussion of the subject in the campaign text book of the democratic party. There has been added also the remedy proposed by Democratic members of congress for the present conditions in the merchant marine and Judge Parker's reference to it in his letter accepting the Democratic nomination for the presidency. These extracts are published simply to show that the shipping question is really the leading question before the people of the United States today. In point of fact the Democratic party is unusually interested in the subject which tends to support the statement that the whole people are aroused over the present disheartening and demoralizing condition of the American merchant marine. Following are the extracts:

1.

NATIONAL PLATFORM PLANK.

MERCHANT MARINE.—We denounce the ship subsidy bill recently passed by the United States senate as an iniquitious appropriation of public funds for private purposes and a wasteful, illogical and useless attempt to overcome by subsidy the obstructions raised by Republican legislation to the growth and development of American commerce on the sea. We favor the upbuilding of a merchant marine without new or additional burdens upon the people and without bounties from the public treasury.

2.

DISCUSSION OF SUBJECT IN CAMPAIGN TEXT BOOK.

THE AMERICAN MERCHANT MARINE.—The Democratic party has ever been the true friend of American shipping.

Under the wise leadership of James Madison, aided by the far-seeing statemanship of Thomas Jefferson, in the early days of our republic our shipping became our most prosperous industry and the mainstay of the nation.

From less than 25 per cent of our foreign commerce carried in American vessels, the policy placed on our statutes by the founders of the Democratic party increased the proportion to about 40 per cent.

During all the years preceding the civil war an average of 75 per cent of our entire foreign commerce was carried in American vessels.

During the past forty-three years less than 20 per cent of our imports and exports have been carried in American vessels.

During the last year of the Buchanan administration the American merchant marine reached the high tide of its prosperity, 2,642,628 tons of shipping being under American registry in the foreign trade, while last year American shipping under registry had fallen to 888,776 tons, a shipping less by nearly 100,000 tons than we had in the foreign trade in 1810, almost a century ago.

It cannot be said that the decline of our shipping under register is due to lack of commerce to carry. Our foreign trade is now more than four times more valuable than it was in 1861, when our shipping engaged in its carriage was three times greater than now. Our ships then carried 65 per cent of our foreign trade, while they now carry eight per cent.

The disappearance of our shipping from the foreign trade is largely due to the outrageous and unnecessarily high tariff inaugurated by the Republican party and maintained in defiance of public condemnation. To this high tariff policy and the high cost of materials used in shipbuilding resulting therefrom is chiefly due the fearful decline in American shipping durng the past forty-three years.

During the long period preceding the adoption of our high tariff policy, American shipping in the foreign trade was able —pratically unaided—to compete successfully and profitably with breign shipping.

In no decade of our history is the record more illuminated with the wonderful growth, superior qualities and high achievements of American shipping than during that between 1850 and 1860. American ships were so cheaply built and they were better built than their foreign rivals; they made an average of three voyages while their foreign competitors were making two; they carried their cargo with less damage; insurance of our ships and their cargoes was less, even in the ports of Great Britain, where they commanded a preference over British ships; their commanders, officers and seamen were men of superior intelligence, of marked integrity and wonderful skill, and the life of our ships compared favorably with those of other nations, and the care exercised in keeping them in almost perfect condition was the marvel as well as the envy of all seafaring people. The presence of an American ship in a foreign port in the heyday of its greatness—the last great decade of Democratic administration—was an event of great importance, and the ship was always crowded with admiring visitors. The fame of American ships was known wherever the waves rolled and the winds blew, and for grace, beauty, speed, safety and endurance they were unequaled.

Contrast the foregoing statement of our maritime conditions with those of the present: Today American ships are all but unknown in the ports of the world. In most of the ports of the continent of Europe an American ship is never seen, and of the thousands of ships and millions of tons that pass through the Suez canal one under the American flag is the greatest of rarities. Such, in short, is the low state to which a once great interest, an industry of vast extent and large profit, has fallen under Republican neglect and misrule.

The Republican party has lacked the courage to apply the protective policy to our shipping which it believes to be necessary for its restoration. Its beloved subsidy policy, a policy that would take millions and tens of millions from the national treasury for the benefit of a limited number of trust-ridden steamship owners, a policy so extravagant and withal so uncertain as to its beneficial results to the nation as to appall some of the more conservative and less greedy of its followers, has been promised them, but it has not been given because of the sturdy and unyielding opposition of the Democratic party, although in a minority.

The Democratic party is pledged to restore American shipping, but not by the exotic and corrupting assistance of the national treasury, not by one-sided subsidies and bounties, not by expedients which rob the many for the benefit of the few.

3.

REMEDY PROPOSED BY DEMOCRATIC MEMBERS OF CONGRESS.

OUR PLAN OF RELIEF.—The merchant marine of this nation, in its early history, was built up as if by magic by the policy of discriminating duties and tonnage taxes.

It is the only system which has proven successful.

All others now proposed are at best mere experiments—guess-work.

We see no insuperable obstacles in the way of its present successful adoption.

The navigation interests of the United States languished before the constitution was adopted, and one of the principal, if not the most potent, factor in bringing about its adoption was the urgent demand for uniform regulations of commerce in favor of our home marine. In 1789 we were carrying 17 per cent of our imports and 30 per cent of our exports.

One of the first acts of the first congress was to establish a tonnage tax of 6 cents on home vessels and 50 cents on foreign vessels entering our ports, and a rebate of 10 per cent of tariff duties on goods imported in American vessels.

Without going into further details of measures passed, the result of this system was that our marine advanced by leaps and bounds, so that in 1794 we carried 91 per cent of our im-

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ports and 86 per cent of our exports in American bottoms. This flattering condition continued in unabated vigor, except temporarily during the war of 1812, until high water mark was reached in 1825, when we carried over 95 per cent of our imports and 89 per cent of our exports.

On the statute books of the United States the discriminating duty system still stands in apparent force, but its vitality has been wiped out by a system of trade conventions with foreign nations, by which their vessels are placed on a level with ours in the ports of the United States.

Not to burden this report with details, it may be fairly said these treaties began to take full effect about 1828, and from that time until now our carrying trade has steadily declined. We lost about 1 per cent a year for thirty years until the civil war. It revived slightly after the war, but again dropped and dwindled, and under this system we now carry about 9 per cent of our traffic.

Many volumes have been written about these things, torrents of debate have poured forth, and many are the theories presented for our consideration, but the "short and simple annals" of our foreign carrying trade are contained in the foregoing. Theory may be piled on theory, but the simple fact is, experience proves that a moderate discriminating duty will accomplish what we all want—and no nation can justly take offense.

The policy of discriminating duties was inagurated by the fathers of the Democratic party, and it has recently had the official sanction of the Republican party, and it may therefore be justly termed non-partisan and broadly American. Jefferson and Madison were the authors of our earliest laws along these lines. Adam Smith, the greatest apostle of free trade, declared that protective navigation laws were the one justifiable exception in his proposed system.

The Republican national platform of 1896 said:

"We favor restoring the early American policy of discriminating duties for the upbuilding of our merchant marine and the protection of our shipping in the foreign carrying trade * * * so that American ships may regain the carrying of our foreign commerce."

Mr. McKinley, in his letter of acceptance, said:

"The policy of discriminating duties which prevailed in the early years of our history should be again promptly adopted by congress and vigorously supported until our prestige and supremacy on the seas are fully attained."

In 1894 Senator Frye proposed in the senate to abrogate the trade conventions and again inaugurate the discriminating duty plan of building up our marine, and was supported by Senator Lodge, Senator Higgins and other Republican senators. In 1897 Senator Elkins delivered an able speech in the senate advocating this policy.

No one questions the certainty and effectiveness of the discriminating-duty plan if it should be adopted. While the Democratic party is opposed to taxing the general industries of the country in order to give the proceeds to a private enterprise, it is not opposed to encouraging the American marine by a reduction of taxation.

The principal argument offered by its opponents is that we must first abrogate over twenty trade conventions with foreign nations, and that these nations would retaliate against our shipping in their ports, and against our exports, especially foodstuffs.

These conventions all contain provisos that they may be annulled on one year's notice (some of them six months' notice) by either party, and fourteen have been so annulled at different times. There is no practical difficulty whatever in the way of annulling them if we so decide. Senator Frye's proposed bill and Senator Elkins' proposed bill for discriminating duties simply fixed the 10 per cent discriminating duty in favor of American vessels, and then provided that the same should take effect in fifteen months, and in the meantime notice of the act should be given to the foreign nations.

With reference to retaliation, it may be said we have no foreign shipping now to speak of, hence they can not hurt us in that direction, while we could soon get back at least 50 per cent of our foreign carrying.

SUBSIDY ADVOCATES ALONE FEAR RETALIATION.

But, the advocates of the subsidy say, foreign nations will retaliate by increased duties against our products. We cannot believe that their expressed fears are genuine. To bring about retaliation from a sensible people you must do some harmful, unjust act—you must grab for more than your share. But to adopt a moderate policy of encouragement of our merchant marine in order to get our just share of trade will not provoke a sane man. If we were seeking what rightfully belonged to them we might expect revengeful measures, but to ask a part of what is ours by all moral standards may call forth their selfish efforts to prevent us from adopting the measures, but not retaliation for purposes of revenge.

The men who see danger of retaliation in discriminating duties are the men who want subsidies. If foreigners were going to retaliate against our foodstuffs, every provocation has been furnished by the Dingley bill. The nation that would stand our almost prohibitive tariffs without retaliation is not going to take offense or umbrage if we adopt conservative measures simply to get a part of our own without the remotest thought of taking anything that belongs to them.

The world needs our products, especially cotton and foodstuffs, and for the welfare of their own people the nations which import our goods cannot afford to do anything to embarrass the quick and cheap importation of our products.

One plan of discriminating duties, much advocated by conservative people, and which involves no danger whatever of retaliation, allows all foreign vessels to carry freely between their own countries and the United States, but levies an extra duty when they carry between the United States and other countries. Speaking of this plan Senator Elkins said, having reference to the South and Central American trade:

"Here is the carrying of nearly $300,000,000, 90 per cent of which is now done in foreign ships, which if this bill becomes a law, without retaliation or opposition of any kind, will come to our ships, and they can not get it in any other way."

In pursuance of the foregoing views we shall, at the proper time, move to recommit the bill (H. R. 7056) to the committee with instructions to bring in a bill providing for discriminating duties in favor of American shipping and for the abrogation of any trade conventions which stand in the way of this course.—*Extract from Report 418, Part 2, House of Representatives, 58th Congress, 2d Session.*

4.

JUDGE PARKER'S REFERENCE TO AMERICAN SHIPPING IN HIS LETTER OF ACCEPTANCE.

AMERICAN SHIPPING.—Our commerce in American bottoms amounts to but 9 per cent of our total exports and imports. For forty years prior to 1861, when the Republican party came into power, our merchant marine carried an average of 8[illegible] per cent of our foreign commerce. By 1877 it had dwindled to 27 per cent. Now we carry but a contemptibly small fraction of our exports and imports.

American shipping in the foreign trade was greater by almost 100,000 tons in 1810—nearly a hundred years ago—than it was last year. In the face of the continuous decline in the record of American shipping during the last forty-three years the promise of the Republican party to restore it is without encouragement. The record of the Democratic party gives assurance that the task can be more wisely intrusted to it.

It is an arduous task to undo the effect of forty years of decadence, and requires the study and investigation of those best fitted by experience to find the remedy—which surely does not lie in the granting of subsidies, wrung from the pockets of all the taxpayers.

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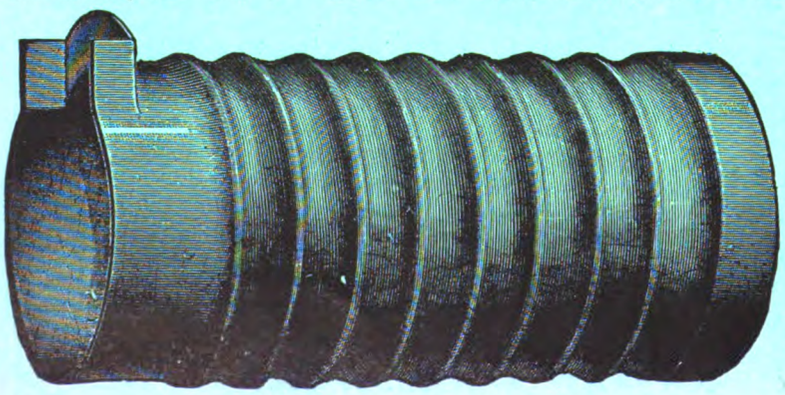

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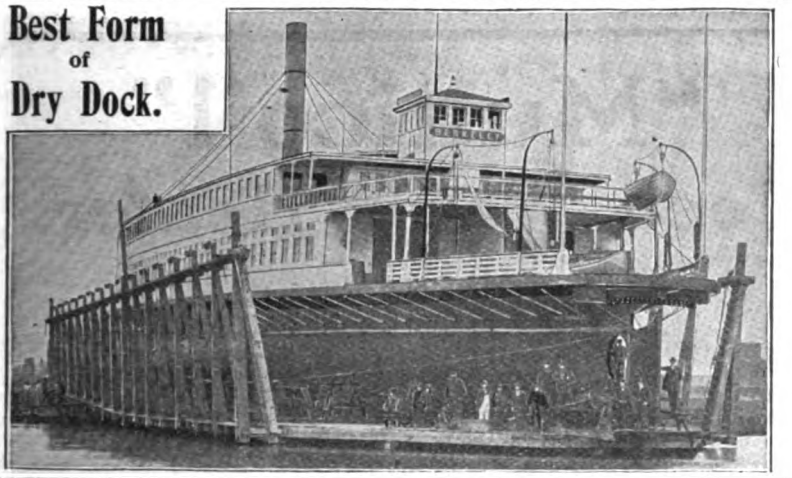

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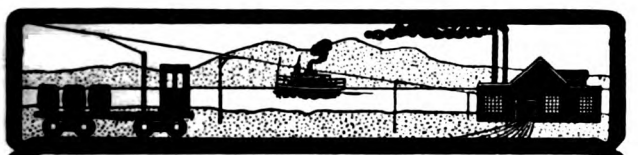

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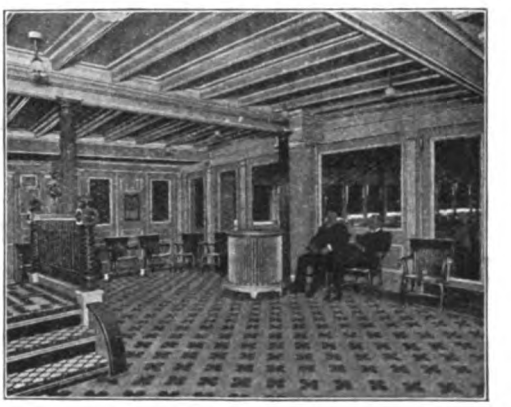

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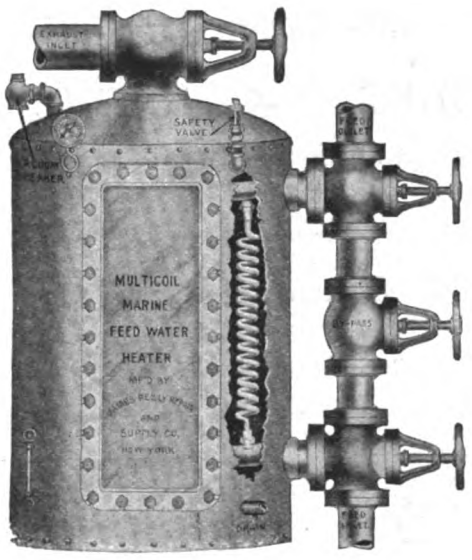

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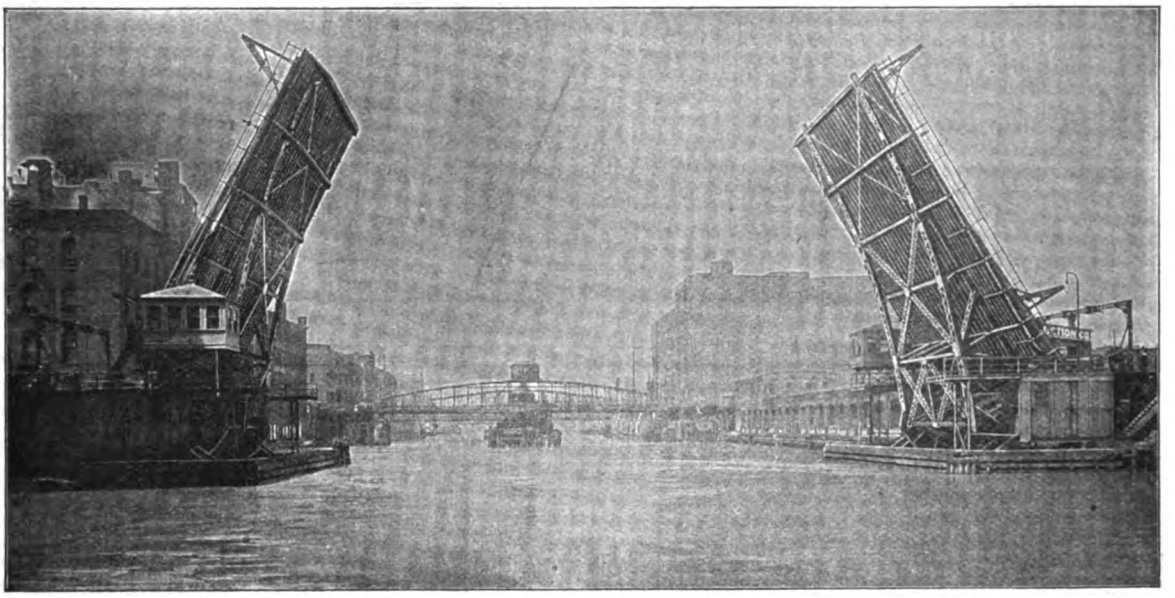

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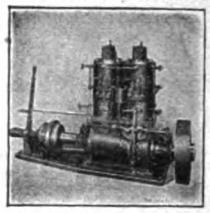

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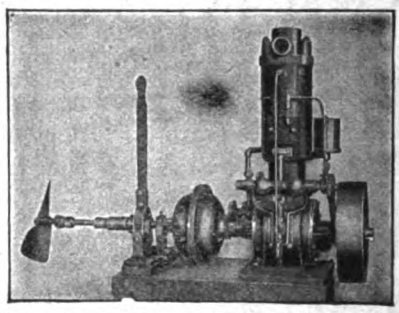

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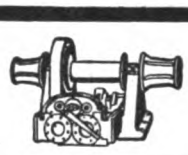

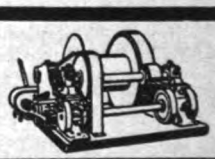

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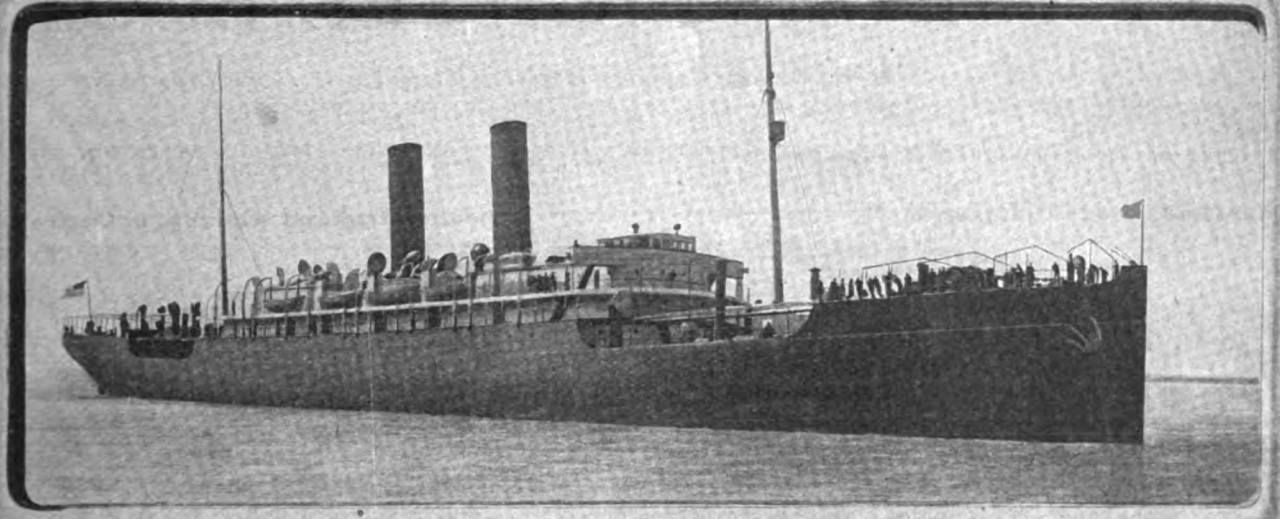

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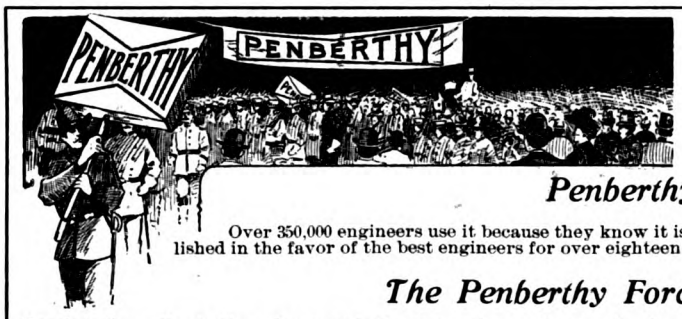

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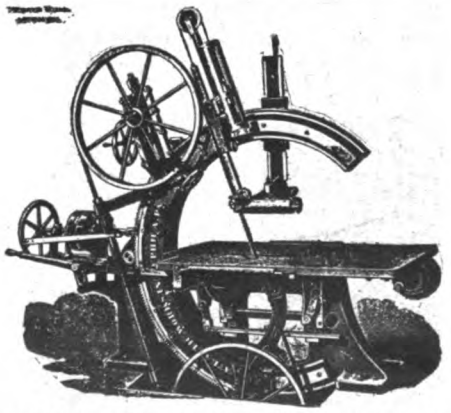

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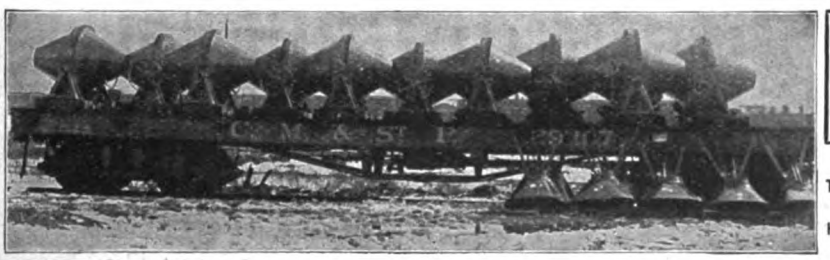

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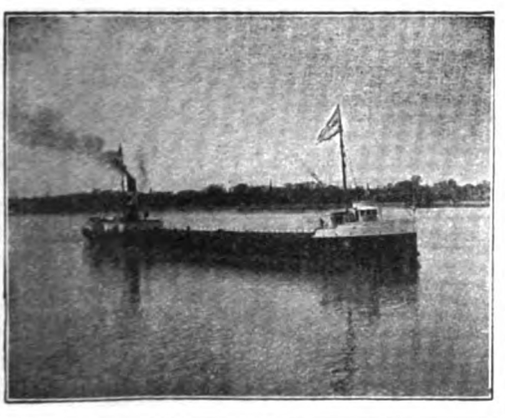

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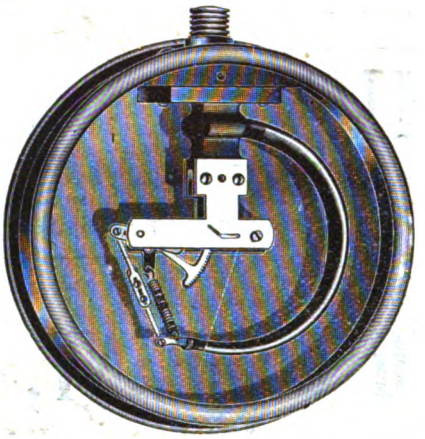

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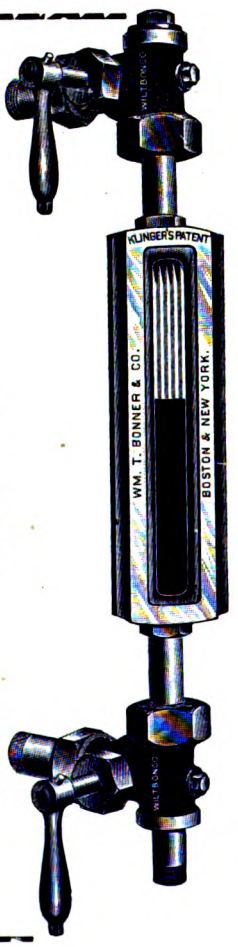

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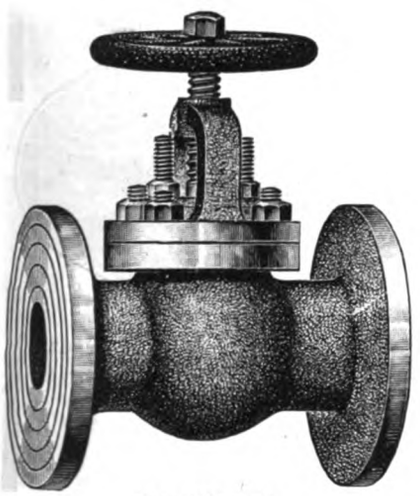

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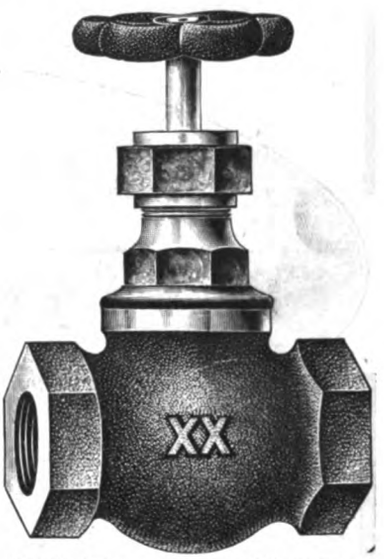

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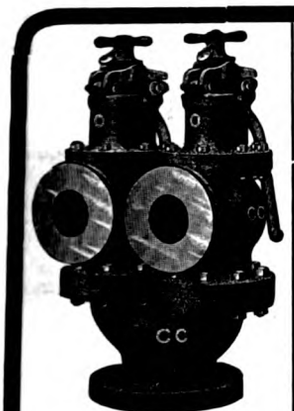

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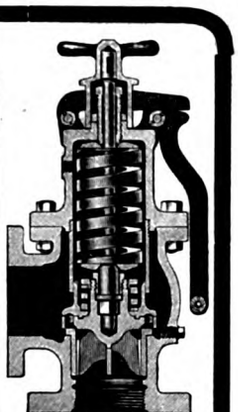

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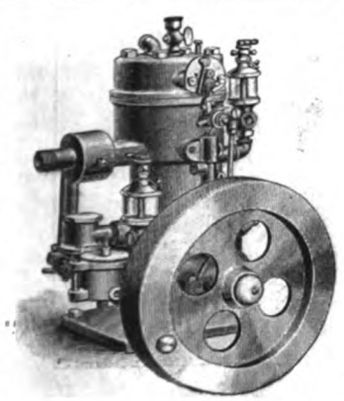

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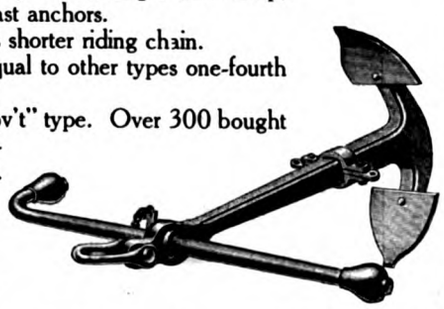

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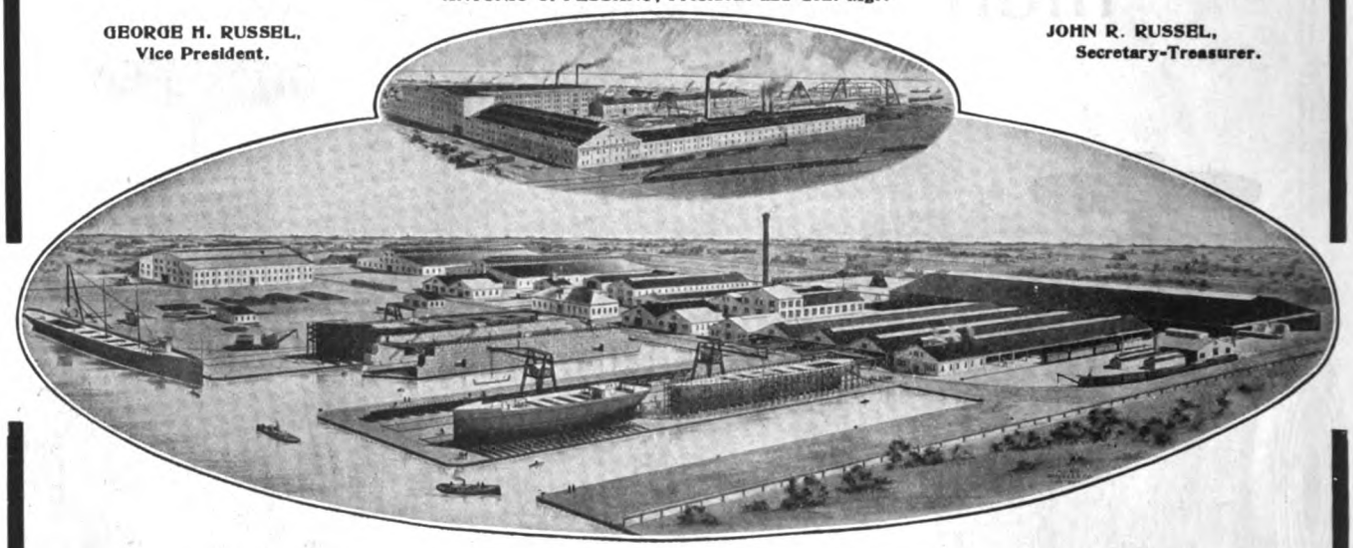

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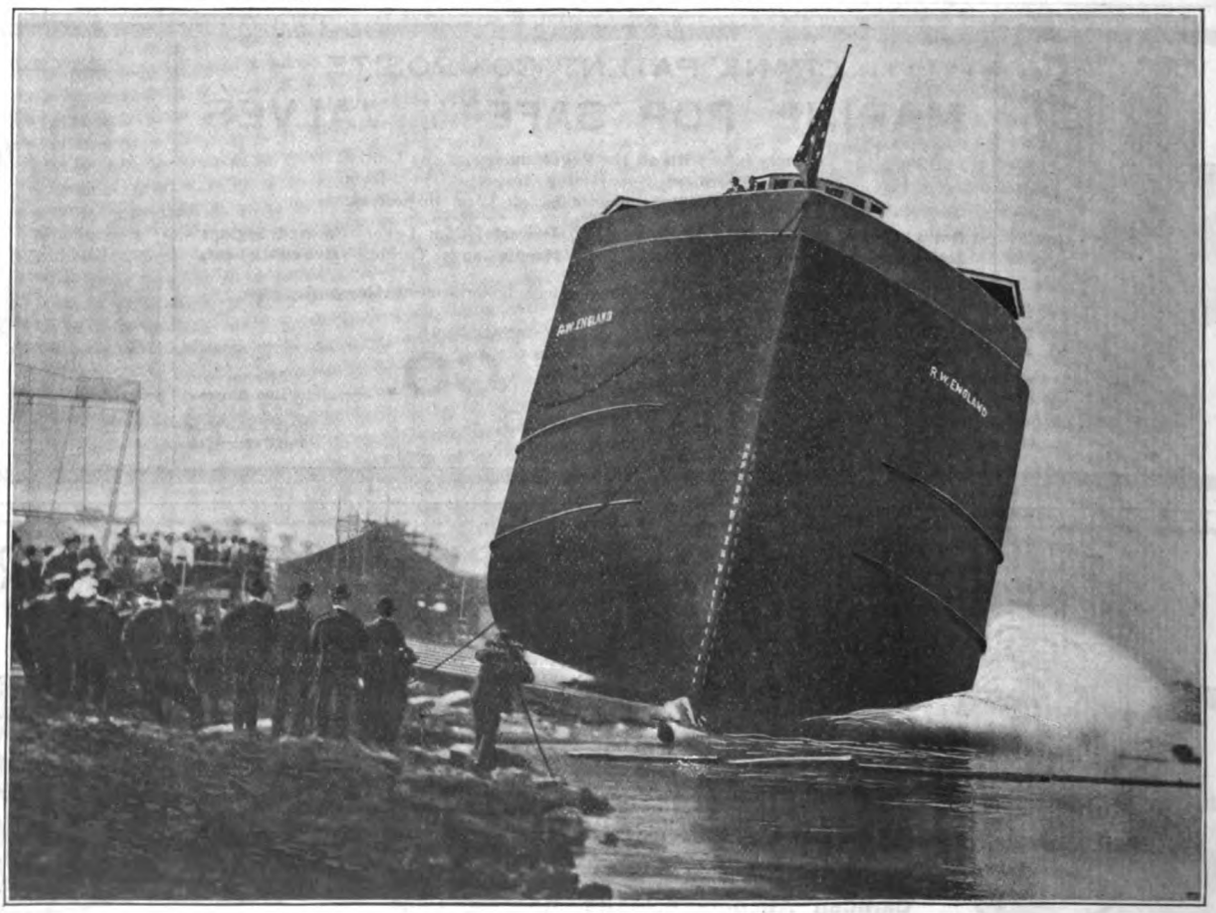

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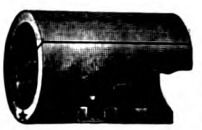

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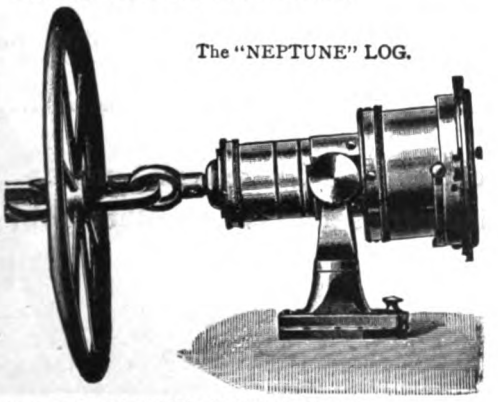

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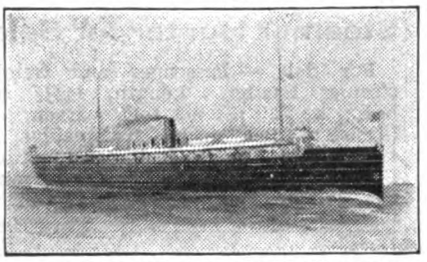

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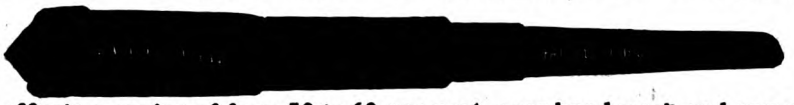

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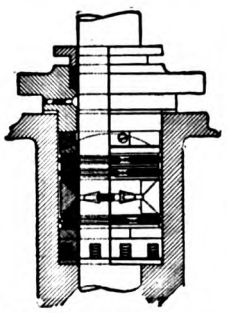

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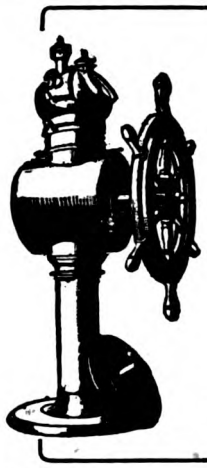

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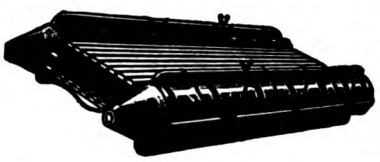

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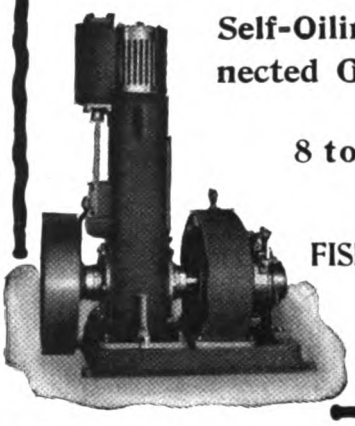

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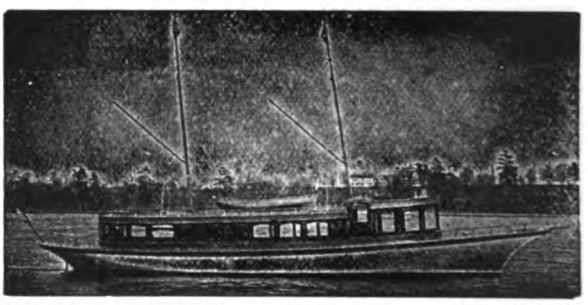

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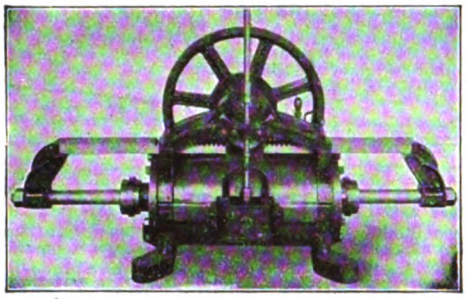

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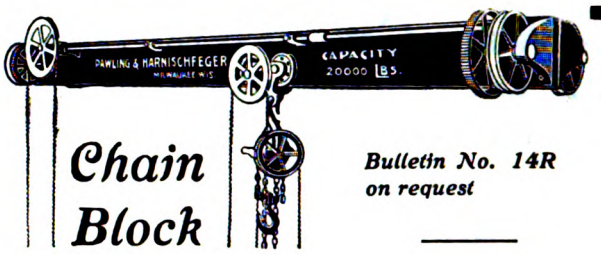

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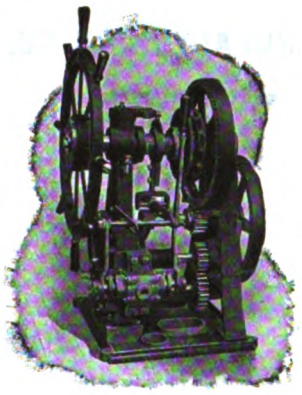

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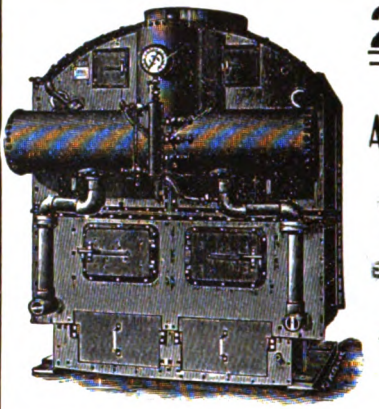

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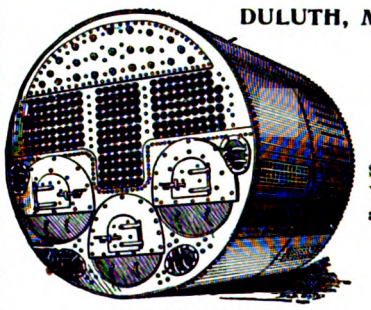

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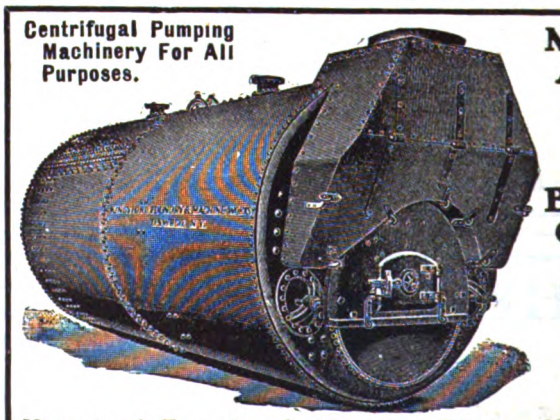

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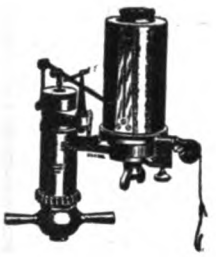

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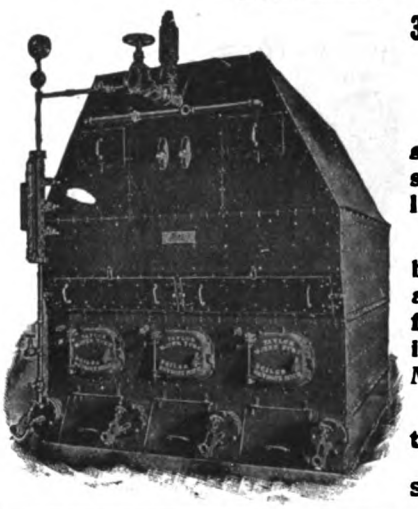

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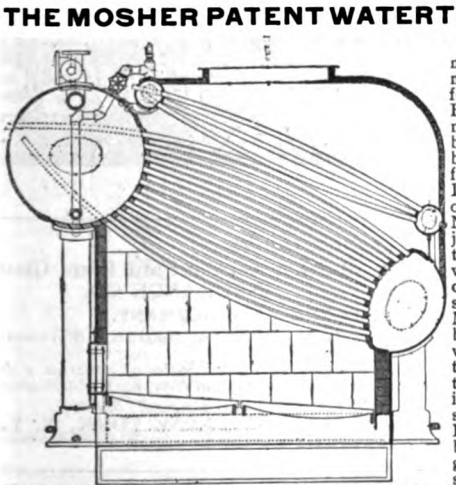

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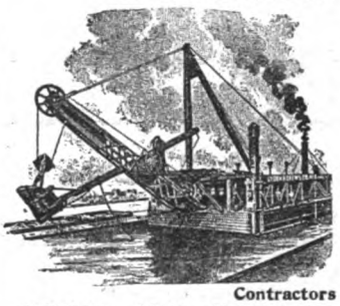

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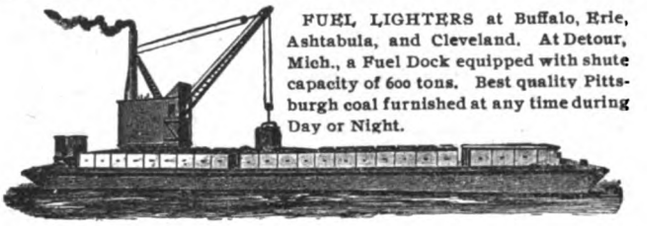

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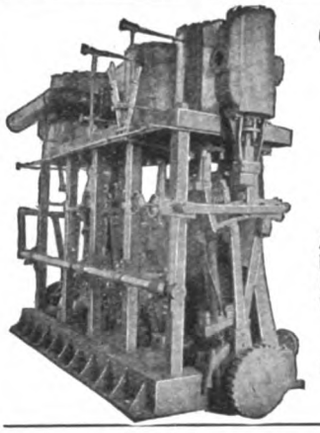

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New York Belting & Packing Co..New York.
Northwestern Steam Boiler & Mfg. Co....
.....Duluth, Minn.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Hynd, Alexander .....Cleveland.
Hunt, Robt. W. & Co.....Chicago.
Kidd, Joseph .....Duluth, Minn.
Kreer & Parsons.....Chicago.
Lovejoy, H. O.....Buffalo.
Matteson & Drake .....Philadelphia.
Mosher, Chas. D.....New York.
Nacey, James .....Cleveland.
Pittsburg Testing Laboratory, Ltd...Pittsburg.
Rice, Henry .....Buffalo.
Roelker, H. B.....New York.
Sadler, Perkins & Field.....New York.
Steel, Adam .....Cleveland.
Wood, W. J. .....Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.

Sturtevant, B. F. Co.....Hyde Park, Mass.

FEED WATER PURIFIERS AND HEATERS.

Reilly Repair and Supply Co., Jas. ...New York.
Ross Valve Co.....Troy, N. Y.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.

General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.....
.....Pittsburg, Pa.

FORGES.

Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co....Cleveland.
Fore River Shipbuilding Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons .....Cleveland.

FUEL ECONOMIZERS.

Sturtevant Co., B. F.....Hyde Park, Mass.

FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co.....Cleveland.
Ironville, Dock & Coal Co.....Toledo, O.
Parker Bros. Co., Ltd.....Detroit.
Picklands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Smith, Stanley B., & Co.....Detroit.
Smith Coal & Dock Co., Stanley B.Toledo, O.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

GASKETS, RUBBER.

New York Belting & Packing Co..New York.

GAS BUOYS.

Safety Car Heating & Lighting Co..New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.
Georgian Bay Engineering Works.....
..... Midland, Ont.
Reliance Mfg. Co..... ..... Providence, R. I.
Temple Pump Co.....Chicago.

GAUGES, STEAM AND VACUUM.

American Steam Gauge & Valve Mfg. Co.
..... Boston.
Ashton Valve Co.....Boston.
Lunkenheimer Co. .....Cincinnati.
Standard Gauge Mfg. Co.....Syracuse, N. Y.

GAUGES, WATER.

Bonner & Co., Wm. T.....Boston.
Lunkenheimer Co. .....Cincinnati, O.
Standard Gauge Mfg. Co.....Syracuse, N. Y.

GRAPHITE.

Dixon Crucible Co., Joseph..Jersey City, N. J.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Hyde Park, Mass.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co. (Inc.)....
..... Cleveland.
Chase Machine Co.....Cleveland.
General Electric Co.....New York.
Georgian Bay Engineering Works.....
..... Midland, Ont.
Hyde Windlass Co.....Bath, Me.
Marine Iron Co.....Bay City.
Mietz, Aug. .....New York.
Pawling & Harnischfeger .....Milwaukee.
Westinghouse Electric & Mfg. Co.....
.....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co...Cuyahoga Falls, O.

HOSE, RUBBER.

New York Belting & Packing Co..New York.

HYDRAULIC DREDGES.

Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Great Lakes Engineering Works.....Detroit.
Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Lunkenheimer Co. .....Cincinnati.
Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.

Elphicke, C. W. & Co.....Chicago.
Fleming & Co., P. H.....Chicago.
Frankfort Marine, A. & P. G. Ins. Co....
..... New York.

INSURANCE, MARINE—Continued.

Gilchrist & Co., C. P.....Cleveland.
Hawgood & Co., W. A.....Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.
McCurdy, Geo. L.....Chicago.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Peck, Chas. E. & W. F..New York & Chicago.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.
Voss, F. D.....New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland. O.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Georgian Bay Engineering Works.....
..... Midland, Ont.
Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P.....Chicago.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong, Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D. .....New York

LIGHTS, SIDE AND SIGNAL.

Russell & Watson .....Buffalo.

LOGS.

Walker & Sons, Thomas ....Birmingham, Eng.
Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph..Jersey City, N. J.

LUBRICATORS.

Crane Co. .....Chicago.
Lunkenheimer Co. .....Cincinnati.

LUMBER.

Martin-Barriss Co.....Cleveland.

MACHINISTS.

Chase Machine Co.....Cleveland.
Hickler Bros. .....Sault Ste. Marie, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Union Machine & Boiler Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.....Philadelphia.

MARINE RAILWAYS.

Hickler Bros. .....Sault Ste. Marie, Mich.

MARINE GLUE.

Ferdinand & Co., L. W.....Boston, Mass.

MARINE RAILWAYS, BUILDERS OF.

Crandall & Son, H. I....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works ...Detroit.
Sturtevant, B. F. Co.....Hyde Park, Mass.

MELTING POT AND PAYING LADLE.

(For Paying Seams of Decks with Marine Glue.)

Ferdinand & Co., L. W.....Boston.

METALLIC PACKING.

Katzenstein, L. & Co.....New York.

METAL POLISH.

Bertram's Oil Polish Co.....Boston

MOTORS, GENERATORS—ELECTRIC.

Fisher Electrical Works.....Detroit.
General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co..... Hyde Park, Mass.
Westinghouse Electric & Mfg. Co.....
..... Pittsburg, Pa.

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Ritchie, E. S., & Sons.....Brookline, Mass.

NAVAL ARCHITECTS.
Hynd, Alexander .....Cleveland.
Kidd, Joseph.....Duluth, Minn.
Kreer & Parsons.....Chicago.
Lovejoy, H. O.....,Buffalo.
Matteson & Drake.....Philadelphia.
Mosher, Chas. D.....New York.
Nacey, James .....Cleveland.
Rice, Henry .....Buffalo.
Sadler, Perkins & Field.....New York.
Steel, Adam .....Cleveland.
Wood, W. J.....Chicago.

OAKUM.
DeGrauw, Aymar & Co.....New York.
Stratford, Oakum Co.....Jersey City, N. J.

OIL ENGINES.
Mietz, Aug. .....New York.

OILS AND LUBRICANTS.
Dixon Crucible Co., Joseph..Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Katzenstein, L. & Co.....New York.
New York Belting & Packing Co...New York.

PACKING TOOL.
Matteson & Drake .....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Detroit Varnish Co.....Detroit.
Detroit White Lead Works.....Detroit.
New Jersey Zinc Co.....New York.
Upson-Walton Co. .....Cleveland.

PATTERN SHOP MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PILE DRIVING AND SUBMARINE WORK.
Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co..
..... Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Hickler Bros. .....Sault Ste. Marie, Mich.
Lake Superior Contracting & Dredging Co.,
.....Duluth, Minn.
Parker Bros. Co., Ltd.....Detroit.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H...Milwaukee.
Sullivan, M. .....Detroit.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland, O.
Crane Co. .....Chicago.
Macbeth Iron Co.....Cleveland.

PLANING MILL MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.
Bourne-Fuller Co.....Cleveland, O.
Otis Steel Co.....Cleveland.

PNEUMATIC TOOLS.
Allen, John F.....New York.

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston.

PRESSURE REGULATORS.
Kieley & Mueller .....New York.
Ross Valve Co.....Troy, N. Y.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works .... East Boston, Mass.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Fore River Shipbuilding Co .....Quincy, Mass.
Great Lakes Engineering Works.. Detroit.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.....
.....Newport News, Va.
Phosphor Bronze Smelting Co., Ltd.....
..... Philadelphia.
Roelker, H. B.....New York.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co....Superior, Wis.
Thropp & Sons Co., J. E.....Trenton, N. J.
Trout, H. G.....Buffalo.
United States Ship Building Co....New York.

PROJECTORS, ELECTRIC.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.....
..... Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F., Mfg. Co.....New York.
Great Lakes Engineering Works Detroit.
Kingsford Foundry & Machine Works....
..... Oswego, N. Y.

PUNCHES, RIVETERS, SHEARS.
Allen, John F. .....New York.

RANGES.
Russell & Watson .....Buffalo

REFRIGERATING APPARATUS.
Great Lakes Engineering Works.....Detroit.
Roelker, H. B. .....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register .....Cleveland.
Record of American & Foreign Shipping..
.....New York.

REPAIRS—ENGINE AND BOILER.
(See also Boiler Manufacturers and Engine Builders.)
Georgian Bay Engineering Works.....
.....Midland, Ont.
Forest City Boiler Co.....Cleveland.

RIVETING MACHINES.
Allen, John F.....New York.

RIVETS, STEEL FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland, O.

SAFETY VALVES.
American Steam Gauge & Valve Mfg. Co.
..... Boston.
Ashton Valve Co.....Boston.
Crane Co. .....Chicago.
Lunkenheimer Co. .....Cincinnati.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby .....Boston.

SALVAGE COMPANIES.
See Wrecking Companies.

SEARCH LIGHTS.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.....
.....Pittsburg, Pa.

SHEARS.
See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne Fuller Co.....Cleveland, O.
Otis Steel Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works .....East Boston, Mass.
Bertram Engine Works Co., Ltd. Toronto, Can.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Ship Building Co.....Detroit.
Fore River Shipbnilding Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.....
.....Newport News, Va.
Roach's Ship Yard .....Chester, Pa.
Shipowner's Dry Dock Co.....Chicago.
Smith & Son, Abram.....Algonac, Mich.
United States Ship Building Co..New York.
Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Marine Mfg. & Supply Co.....New York.
Upson-Walton Co.....Cleveland.

SHIP DESIGNERS.
Kidd, Joseph.....Duluth.
Kreer & Parsons.....Chicago.
Matteson & Drake.....Buffalo.
Rice & Lovejoy.....Buffalo.
Steel, Nacey & Hynd.....Cleveland.
Wood, W. J.....Chicago.

SHIP LANTERNS AND LAMPS.
Russell & Watson .....Buffalo.

SHIP TIMBER.
Martin-Barriss Co.....Cleveland.

SMOOTH-ON COMPOUND, FOR REPAIRS.
Smooth-On Mfg. Co.....Jersey City, N. J.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co..Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.
Gilchrist & Co., C. P. .....Cleveland.
Holmes, Samuel .....New York.
Lester, S. S.....Quebec, Can
McCarthy, T. R.....Montreal, Can.

STEAMSHIP LINES, PASS. AND FREIGHT.
American Line .....New York.
Anchor Line .....Buffalo.
Boston Steamship Co.....Boston.
Cleveland & Buffalo Transit Co.....Cleveland.
Detroit & Cleveland Line.....Cleveland.
Erie & Western Trans. Co.....Buffalo.
Goodrich Trans. Co.....Chicago.
International Mercantile Marine Co.....
..... Philadelphia.
Manitou Steamship Co.....Chicago.
Mexican-American S. S. Co..New Orleans, La.
New York & Cuba Mail S. S. Co.....New York
Niagara, St. Catharines & Toronto Ry. & Nav. Co. .....St. Catharines, Ont.
Northern Michigan Trans. Co.....Chicago.
Red Star Line .....New York.
Richelieu & Ontario Nav. Co. ...Montreal, Can.
United Fruit Co .....Boston.

STEEL CASTINGS.
Macbeth Iron Co.....Cleveland.
Otis Steel Co.....Cleveland.

STEERING APPARATUS.
American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Dake Engine Co.....Grand Haven, Mich.
Detroit Ship Building Co.....Detroit.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co....Port Huron, Mich.
Marine Mfg. & Supply Co.....New York.
Moulton Steering Engine Co.....New York.
Pawling & Harnischfeger .....Milwaukee.
Sheriffs Mfg. Co.....Milwaukee.

SUBMARINE DIVING APPARATUS.
Morse & Son, A. J.....Boston.
Schrader's Son, A.....New York.

SURVEYORS, MARINE.
Gaskin, Edward .....Buffalo.
Hynd, Alexander .....Cleveland.
Lovejoy, H. O.....Buffalo.
Matteson & Drake .....Philadelphia.
Parker Bros. Co., Ltd.....Detroit.
Nacey, James .....Cleveland.
Rice, Henry .....Buffalo.
Steel, Adam .....Cleveland.
Wood, W. J.....Chicago.

TESTS OF MATERIALS.
Hunt, Robert W. & Co.....Chicago.
Pittsburg Testing Laboratory, Ltd....Pittsburg.

TILING, INTERLOCKING RUBBER.
New York Belting & Packing Co...New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
Allen, John F.....New York.
Watson-Stillman Co.....New York.

TOOLS, WOOD WORKING.
Atlantic Works, Inc.....Philadelphia.

TOWING MACHINES.
American Ship Windlass Co..Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.
Donnelly Salvage & Wrecking Co.....
.....Kingston, Ont.
Great Lakes Towing Co.....Cleveland.
Midland Towing & Wrecking Co., Ltd....
.....Midland, Ont.

TRAPS, STEAM.
Kieley & Mueller .....New York.
Lunkenheimer Co. .....Cincinnati.
Sturtevant Co., B. F., ...Hyde Park, Mass.

TRUCKS.
Boston & Lockport Block Co.....Boston.

TUBING, SEAMLESS.
Shelby Steel Tube Co.....Pittsburg, Pa.

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American Steam Gauge & Valve Mfg. Co. ..... Boston.
Ashton Valve Co. ..... Boston.
Crane Co. ..... Chicago.
Jenkins Bros. ..... New York.
Kieley & Mueller ..... New York.
Lunkenheimer Co. ..... Cincinnati.
Ross Valve Co. ..... Troy, N. Y.

VALVES FOR WATER AND GAS.

Ross Valve Co. ..... Troy, N. Y.

VARNISHES.

Detroit Varnish Co. ..... Detroit.
Detroit White Lead Works ..... Detroit.
New Jersey Zinc Co. ..... New York.
Also Ship Chandlers.

VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co. ..... Hyde Park, Mass.

VESSEL AND FREIGHT AGENTS.

Boland, John J. ..... Buffalo.
Brown & Co. ..... Buffalo.
Elphicke, C. W. & Co. ..... Chicago.
Fleming & Co., P. H. ..... Chicago.
Gilchrist & Co., C. P. ..... Cleveland.
Hall & Root ..... Buffalo.
Helm & Co., D. T. ..... Duluth.

VESSEL AND FREIGHT AGENTS—Con.

Hawgood & Co., W. A. ..... Cleveland.
Holmes, Samuel ..... New York.
Hutchinson & Co. ..... Cleveland.
Lester, S. S. ..... Quebec, Can.
McCarthy, T. R. ..... Montreal.
Mitchell & Co. ..... Cleveland.
Parker Bros. Co., Ltd. ..... Detroit.
Prindiville & Co. ..... Chicago.
Richardson, W. C. ..... Cleveland.
Sullivan, D. & Co. ..... Chicago.

WATER GAUGES.

Bonner & Co., Wm. T. ..... Boston
Lunkenheimer Co. ..... Cincinnati, O.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co. ..... Buffalo.
DeGrauw, Aymar & Co. ..... New York.
Upson-Walton Co. ..... Cleveland.

WHISTLES, STEAM.

American Steam Gauge & Valve Mfg. Co. ..... Boston.
Ashton Valve Co. ..... Boston.
Lunkenheimer Co. ..... Cincinnati.

WINDLASSES.

American Ship Windlass Co. . Providence, R. I.
American Ship Building Co. ..... Cleveland.
Hyde Windlass Co. ..... Bath, Me.
Jenks Ship Building Co. ... Port Huron, Mich.
Marine Mfg. & Supply Co. ..... New York.

WINCHES.

American Ship Windlass Co. . Providence, R. I.
Georgian Bay Engineering Works. ..... Midland, Ont.
Hyde Windlass Co. ..... Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc. ..... Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. ..... Kingston, Ont.
Great Lakes Towing Co. ..... Cleveland.
Midland Towing & Wrecking Co., Ltd. ..... Midland, Ont.
Parker Bros. Co., Ltd. ..... Detroit.

YACHT AND BOAT BUILDERS.

Bertram Engine Works Co., Ltd. . Toronto, Can.
Drein, Thos. & Son. ..... Wilmington, Del.
Georgian Bay Engineering Works. ..... Midland, Ont.
Truscott Boat Mfg. Co. ..... St. Joseph, Mich.
Willard, Chas. P. & Co. ..... Chicago.

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Drein, Thos. & Son. ..... Wilmington, Del.

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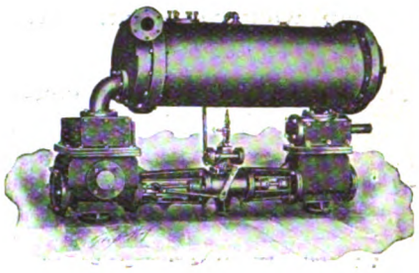

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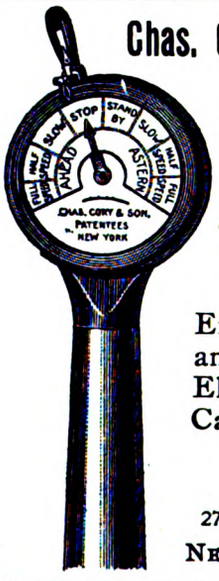

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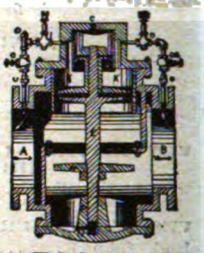

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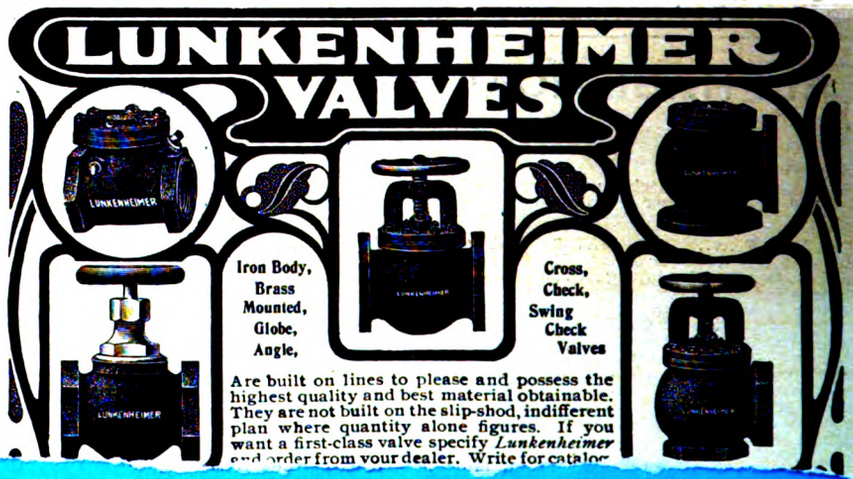

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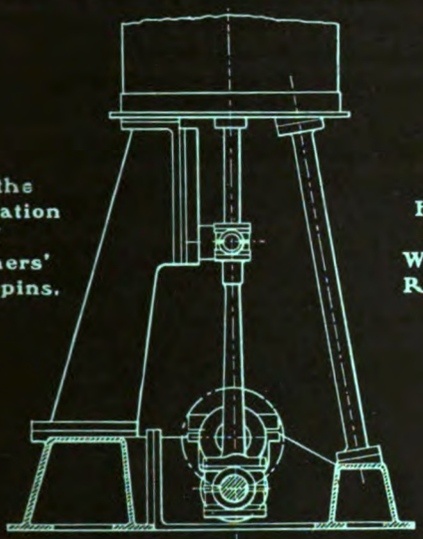

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No. 22, Lake Shore Limited	*2:12 a.m.	*2:20 a.m.
No. 20, Chicago and Cleveland Exp.	*7:20 a.m.	.....
No. 28, New York and Boston Exp.	*7:40 a.m.	*8:00 a.m.
No. 40, Toledo and Buffalo Accom	†10:00 a.m.	†10:30 a.m.
No. 32, Fast Mail	*11:25 a.m.	*11:30 a.m.
No. 48, Accommodation via Sandusky	†1:40 p.m.	.....
No. 42, Boston-New York Express	.....	*11:45 a.m.
No. 44, Cleveland and New York Spl.	.....	*3:00 p.m.
No. 46, Southwestern Express	.....	*3:10 p.m.
No. 116, Ashtabula Accommodation	.....	†4:30 p.m.
No. 6, Limited Fast Mail	*5:40 p.m.	*5:45 p.m.
No. 26, 20th Century Limited	*7:40 p.m.	*7:43 p.m.
No. 10, Chicago, N.Y. & Boston Spl.	*7:30 p.m.	*7:50 p.m.
No. 16, New England Express	*10:30 p.m.	*10:35 p.m.
No. 2, Day Express	†9:10 p.m.	†9:25 p.m.
No. 126, Norwalk Accommodation	†7:55 a.m.	.....

Westward	Arrive from East	Depart West
No. 7, Exposition Limited	*12:50 a.m.	.....
No. 11, Southwestern Limited	*2:55 a.m.	.....
No 9, Day Express	.....	†6:10 a m.
No. 15, Boston and Chicago Special	*3:10 a.m.	*3:15 a.m.
No. 19, Lake Shore Limited	*7:15 a.m.	*7:25 a.m.
No. 23, Western Express	*10:30 a.m.	*10:35 a.m.
No. 29, Southwestern Special	‡11:10 a.m.	.....
No. 33, Southwestern Express	*12:25 p.m.	.....
No. 133, Cleveland and Detroit Exp.	.....	*12:45 p.m.
No. 47, Accommodation	†11:00 a.m.	†3:00 p m.
No. 141, Sandusky Accommodation	.....	†3:10 p.m.
No. 43, Fast Mail	*4:35 p.m.	*4:40 p.m.
No. 127, Norwalk Accommodation	.....	†5:10 p.m.
No. 37, Pacific Express	*6:50 p.m.	*7:20 p m.
No. 3, Fast Mail Limited	*10.50 p.m.	*10:55 p.m.
No. 115, Ashtabula Accommodation	*8.30 a.m.	.....

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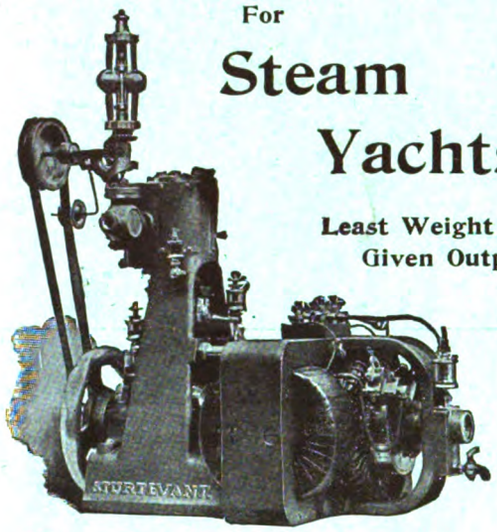

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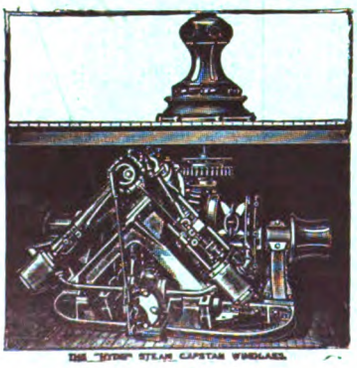

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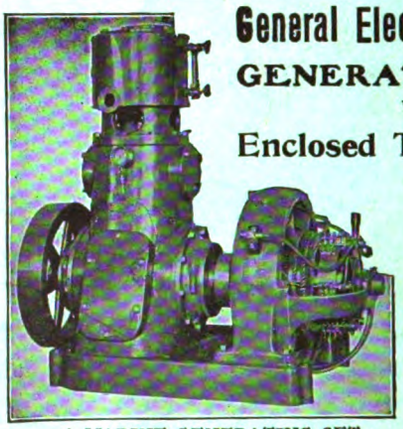

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